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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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B. Bibliographic references to other items of interest to the profession.

C. Cumulative, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 1 MAY 1950 No. 5

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Tornadoes

(For complete table of contents see back cover)

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FOREWORD

Each issue of Meteorological Abstracts and Bibliography consists of four parts, as ca be seen in the table of contents on the back cover.

Part I comprises 100 to 200 classified and annotated references to current material in th field of *Meteorology* and other fields immediately applicable to *Meteorology*.

In addition, the first issue (Vol. 1, No. 1) contained a **Review of 30 Current Meteorologica Periodicals,** and the second issue a **Review of 15 Meteorological Periodicals which have lapse** Reviews of irregular publications (serials), bibliographic sources, and miscellaneous periodica which frequently contain meteorological literature will appear as soon as practicable.

Part II of each issue provides a means of accumulating the important references on give subjects without respect to recency. It is impossible to make these bibliographies exhaustiv under present personnel, time and printing limitations; but every attempt is made to include representative cross section of the various aspects of each subject, some preference being give to recent material, comprehensive works, those from obscure sources and those with goo bibliographies.

Selective, annotated bibliographies consisting of from 100 to 300 items each, have bee printed in the issues of Meteorological Abstracts and Bibliography, as follows:

(1) **Atmospheric Pollution,** Vol. 1, No. 1, Jan. 1950
(2) **Aerobiology,** Vol. 1, No. 2, Feb. 1950
(3) **Cloud Physics and "Rain Making,"** Vol. 1, No. 3, March 1950
(4) **Hail,** Vol. 1, No. 4, April 1950
(5) **Tornadoes,** Vol. 1, No. 5, May 1950

Future issues will contain:

(6) **Volcanic Dust,** Vol. 1, No. 6, June 1950
(7) **Climatic Changes,** Vol. 1, No. 7, July 1950

Other subjects which will appear in early issues are: **Thunderstorms, Icing, Energy Ex change in the Atmosphere, Long Range Forecasting, etc.**

In Part III the contents of those journals which are primarily meteorological are liste and published in the earliest issue where space permits. These entries are not classified c indexed, as it is thus possible for the information to appear a month or two earlier than woul be the case if a more rigid form of entry were used.

Part IV consists of author, subject and geographical indexes. The subject and geo graphical indexes are made up, as a rule, from the subject headings which follow each entr in parts I and II.

In the June and December issues *cumulative* author and subject indexes will be published

LIST OF PERIODICALS

Note: In this list the preferred form of title for entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organization follows the title. If the title is not distinctive the issuing organization precedes and is part of the title.

ERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

kademiia Nauk, SSSR, Izvestiia, Ser. Geogr. i Geofiz., [Moscow].
merican Geophysical Union, Transactions, National Research Council, Washington.
merican Meteorological Society, Bulletin, [Boston].
nnalen der Meteorologie, Meteorologisches Amt für Nordwestdeutschland, Hamburg, [British Zone, Germany].
nnali di Geofisica, Istituto Nazionale di Geofisica, [Rome].
iel et Terre, Société Belge d'Astronomie, de Météorologie et de Physique du Globe. Uccle-Bruxelles.
eofisica Pura e Applicata, Istituto Geofisica Italiano, [Milan].
eophysical Magazine, [Central Meteorological Observatory, Toyko].
emel en Dampkring, Nederlandse Vereniging voor Weer- en Sterrenkunde, [The Hague].
döjárás, Az Országos Meteorológiai és Földmágnességi Intézet, [Budapest].
ournal of Geophysical Research (formerly Terrestrial Magnetism and Atmospheric Electricity), [Washington].
ournal of Meteorology, American Meteorological Society, [Boston].
ournal Scientifique de la Météorologie, Société Météorologique de France, [Paris].
he Marine Observer, Air Ministry, Meteorological Office, London.
he Meteorological Magazine, Air Ministry, Meteorological Office, London.
leteorological Society of Japan, Journal, Second Series, Kisho Shushi, [Tokyo].
leteorologické Zprávy, Státní Meteorologický ústav v Praze, [Prague].
a Météorologie, Société Météorologique de France, [Paris].
leteorologische Rundschau, Bad-Kissingen, [U. S. Zone, Germany].
lonthly Weather Review, U. S. Weather Bureau, Washington, D. C.
limbus, Sociedad Meteorológica de Bolivia, [La Paz].
olarforschung, Archiv für Polarforschung in Kiel, [Kiel, British Zone, Germany].
evista Meteorológica, Junta Nacional de Meteorología, Montevideo.
ivista di Meteorologia Aeronautica, Associazione Culturale Aeronautica, [Rome].
oyal Meteorological Society, Quarterly Journal, [London].
he Royal Society of London, Proceedings, Series A, Mathematical and Physical Sciences, [London].
ellus, Svenska Geofysiska Föreningen, Stockholm.
sesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
Veather, Royal Meteorological Society, [London].
Veatherwise, Amateur Weathermen of America, Philadelphia.
Vetter und Klima, Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Seelbach b. Lahr/Baden, [French Zone, Germany].
Vetter und Leben, Österreichische Gesellschaft für Meteorologie, [Vienna].
eitschrift für Meteorologie, Meteorologisches Observatorium, Potsdam, [U. S. S. R. Zone, Germany].

★ Indicates those periodicals which are primarily meteorological.

EXPLANATIONS

Location of material: While it is physically impossible to give for each entry the name of eve library where that item might be obtained, it is possible, by using standard library symbols, to g the reader some idea of where he might obtain such material. So in most instances a symbol tak from the Union List of Serials (Gregory), or the Union Catalogue of the Library of Congress will given just before the text of each abstract. In some cases where no symbol has been assigned a library, one will be invented by using the general principle of the Union Catalogue list. As a r the library indicated will be in the District of Columbia, with an occasional reference to one in N York or Boston. It will be noted that D stands for District of Columbia, M for Massachusetts a N for New York. Thus **DWB** stands for the U. S. Weather Bureau Library in Washington, D. and **MH–BH** for the Blue Hill branch of the Harvard Library in Boston, Mass. In the latter ca since the Blue Hill Observatory contains not only the Harvard Observatory Library but that of t American Meteorological Society, the same symbol (**MH–BH**) will stand for either or both librari

Library symbols: The following abbreviations have been used for Libraries in which the speci material thus indicated in this issue is located:

DA:	U. S. Department of Agriculture Library, Washington, D. C.
DAMS:	Material in hands of American Meteorological Society Abstracts, P.O. Box 17 Washington 13, D. C.
DAWS:	Air Weather Service, Technical Information Files, Andrews Air Base, Washingt 25, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSG:	U. S. Army Medical Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
MH:	Harvard University Library, Cambribge, Mass.
MH–BH:	Harvard University, Blue Hill Observatory (and American Meteorological Societ Library, Milton, Mass.
NSGE:	General Electric Research Library, Schenectady, N. Y.

Geographical (place) names are in the form generally used internationally, rather than in the fo used locally. For instance Vienna is used instead of Wien, Florence for Firenza, Moscow for Mosk and Germany for Deutschland, etc.

Titles of articles or monographs are in the language of the original article unless otherwise stat Slavic (Cyrillic) titles are transliterated according to the Library of Congress transliteration schem into the Roman Alphabet.

Entries for **titles of periodicals** are given in the form used on the title page of the periodical provid the title is distinctive (Monthly Weather Review, Meteorologiské Zprávy, and Revista Mete ológica). If the journal is the official organ of a society or institution and the title is not distinct as is the case with Transactions, Bulletins, Proceedings, Comptes Rendus, Trudy, Izvestiia, Sitzun berichte, Verhandelingen, Miscellanées, etc., the preferred name of the organization is given fi as part of the title (American Geophysical Union, Transactions; Royal Society of London, P ceedings).

Abbreviations and other symbols:

Titles of periodicals are not abbreviated as a rule. Other abbreviations will be used sparing and only when the abbreviation is obvious.

The months of the year from March through July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec., respectively.

The word or abbreviation for Volume, (Tom, Band, Jahrgang, Año, etc.) and for Num (Heft, Fascicule, Vypusk) and page or pages is omitted from most entries. Thus an entry will re as follows:

Meteorologische Rundschau 2(5/6):146–151, May/June 1949.

This indicates that the article was in the Meteorologische Rundschau, Jahrgang 2 (Vol. Heft 5/6 (No. 5 and 6), pages 146–151, Mai/Juni 1949.

The symbol * before an entry indicates a good data source.

The symbol † before an entry indicates a good bibliography source.

The symbol § indicates a synoptic case history study accompanied by charts.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL METEOROLOGY

5–1 551.5(02)

§Starr, Arthur J., **A first book of meteorology.** London, George G. Harrap, **1949.** 86 p., figs. (including synoptic charts), tables, append. "Further reading": p. 77. **DLC**—A mple, illustrated, modern British text giving a layman the basic facts about the atmosphere, inds, clouds, visibility, observations, weather maps, analysis and forecasting, without burden- g him with theory or technical details. Although on a high school level, the sample layout r a school meteorological station is equal to most agricultural college stations, as it includes il thermometers and grass minimum thermometers, sunshine recorders and the usual co- perative observer equipment. *Subject Headings:* **Elementary meteorology, Popular works, extbooks.**—*M.R.*

5–2 551.501.9 551.5:06

Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby, **Spisok gidrometeorologicheskikh antsii i postov, GUGMS, SSSR, po sostoianiiu na 1 ianvaria 1945 g.** [List of hydrometeoro- gical stations and posts of the USSR Hydrometeorological Services as of Jan. 1, 1945.] oscow, Gidromet. Izdat., **1945.** 342 p., 5 figs., 4 append. **DPL**—A catalogue of over 6,500 drological or meteorological stations and posts, comprising the entire observational network the USSR Hydrometeorological Service (GUGMS) as of Jan. 1, 1945. It does not contain any of the stations restored or opened after the occupation, but does give the basic data (call mber, name, region, basin, geographical coordinates, elevation of observation point and rometer, and class of station) arranged in numerical order in the first part (p. 8–271) and in phabetical order (p. 273–336) in the second part, followed by a key showing in detail the ne of observation and elements observed at each of the 40 classes (types) of stations. *Subject adings:* **Networks, Station locations, Manuals, U.S.S.R.**—*M.R.*

5–3 551.5:06

Haworth, Norman, **Science and development in the Pacific area.** *Nature,* [London], 3(4143):469–472, March 26, **1949.** **DLC**—Account of Seventh Pacific Science Congress ich met in Auckland and Christchurch, New Zealand, Feb. 2–22, 1949. Mainly concerns sion of geology, vulcanology and geophysics section, including account of several meteoro- ical papers. Major W. S. Barney and R. H. Simpson of U. S. Air Force and U. S. Weather reau discussed typhoons. C. H. B. Priestly and Geoffrey Taylor contributed papers on neral circulation and convection and E. G. Bowen on artificial rain production. *Subject ading:* **International organizations, Pacific Science Congress.**—*M.R.*

5–4 551.5:06(09)

Corless, R., **A brief history of the Royal Meteorological Society.** *Weather,* 5(3):78–83, arch **1950.** 2 plates. **DWB, MH-BH**—Formed as British Meteorological Society April 50 with about 150 members. Gives list of notable presidents and Symons Medallists, and count of activities. *Subject Headings:* **Meteorological organizations, Royal Meteorological ciety, History.**

5–5 551.5(05)

Indian Journal of Meteorology and Geophysics (Quarterly). Issued by the India Meteoro- ical Department. Published by the Manager of Publications, Delhi. Printed by E. K. ja at the Mission Press, Allahabad. Size, 18½x24½ cm. Price 2–4 R. or 3s. 9d./copy. l. I, No. 1, appeared January, **1950.** Editorial Office: Director General of Observatories, di Road, New Delhi, India. **MH-BH**—A medium for the publication of contributions in the

field of meteorology, geophysics and astrophysics. Includes original papers (<15,000 word articles in readily assimilable form (<10,000 words), notes, reviews, news and letters to t editor. Illustrated with figures, charts, diagrams, tables. First issue contains an encouragi message from Jawaharlal Nehru as well as from other notables interested in scientific researc resources, communications, etc. The first article (by S. K. Banerji, Director General of Observa tions and the founder of this new journal), is on the important subject of long range forecasti of the monsoon and winter rainfall in India. There are other original papers or articles a aerology, acoustics, microclimatology, waves in the westerlies, vertical motion, etc., the titl of which will be found in Part III (page 271) of our April issue. Each number contains editor comments, a few popular articles, original scientific papers, notes and news about geophysi developments, letters to the editor regarding special phenomena or research, reviews of rece literature, etc. *Subject Headings:* **Periodicals, Meteorology, Geophysics, India.**—*M.R.*

5–6 551.5(05)(0

Watt-Watson, Robert, **The centenary.** *Weather*, 5(3):76–77, March **1950. DW MH-BH**—*Subject Headings:* **Periodicals, Conventions, History.**

5–7 551.5(0

Johnson, Nelson, **Milestones in a century of meteorology.** *Weather*, 5(3):87–90, Mar **1950.** 2 plates. **DWB, MH-BH**—*Subject Headings:* **Progress reports, History.**

5–8 551.5(0

Dora Silva, E., **El régimen del tiempo.** [The weather regime.] *Boletin de Estud Geográficos*, [Mendoza], 1(1):23–33, 4th quarter **1948. DLC**—A fairly lengthy discussion the history of and advances in meteorology and observational methods in various countri but with particular reference to South America. Considerable detail is provided on trajector of cyclones and anticyclones, air masses, winds and weather forecasting in Argentina. T writer expresses the need for an ample network of surface and upper-air observation statio not only in Argentina but also in adjacent countries and the Antarctic. *Subject Headin* **General meteorology, History, Argentina, South America.**—*M.R.*

5–9 551.5:

†Hess, Seymour L., **Some aspects of the meteorology of Mars.** *Journal of Meteorolo* 7(1):1–13, Feb. **1950.** 11 figs., 12 refs., 19 equations. **DLC, DWB**—A thorough treatment the various observed phenomena on Mars and the derived meteorological conditions (pressu density, convection, atmospheric circulation, temperature, atmospheric composition, clou dust storms, polar caps, water vapor and carbon dioxide). A model of the stratosphere constructed, and isothermal and isobaric charts prepared for Northern Winter in Mars. attempt is made to explain the yellow and blue clouds. Similarities and differences betwe the general circulation on Mars and the Earth are discussed. A number of excellent pho graphs of Mars, showing the polar ice caps, the yellow clouds and the blue clouds, are produced. Work for this paper was done at Lowell Observatory. *Subject Headings:* **Planeta atmospheres, Mars.**—*M.R.*

5–10 551.5:629.13(0

Shields, Bert A., **Meteorology.** (In his **Air pilot training.** New York, McGraw-H **1948.** p. 565–710. 101 figs.) **DLC**—A nontechnical training manual on airplanes, a navigation and meteorology. Part IV, entitled Meteorology, contains ten chapters on m teorology for pilots, in which are discussed the composition, structure and thermodynamics the atmosphere, behavior of gases, water vapor, stability and instability, winds, air mass fronts, weather maps, charts and reporting systems; and finally, applications such as altimetr forecasting and need for future research and development. The material (text and illustr tions) is not highly technical but is quite up-to-date in references to instruments, observatio methods and communications, and contains many practical hints regarding flying weath *Subject Headings:* **Aeronautical meteorology, Textbooks.**—*M.R.*

5–11 551.5:656.6(02)

§Petterssen, Sverre and Spinnangr, Finn, **Meteorologi for sjöfolk.** [Meteorology for eamen.] Bergen, John Griegs Forlag, **1938.** 160 p., 88 figs., (including 9 synoptic charts), 1 tables. Issued in pocket, a booklet by Sverre Petterssen and John Gåsland entitled **Vaer-ieldinger for skibsfarten,** [Weather reports for navigation.] Bergen, John Griegs Forlag, **938.** 86 p., 5 figs., codes, symbols, 26 tables, 14 indices of meteorological stations. **DLC**—A ell illustrated and modern text (in Norwegian) on meteorology for mariners. The greater art of the book is concerned with air masses, fronts, cyclones, anticyclones, weather analysis nd forecasting, tropical storms and actual case histories of synoptic situations illustrated by a core of analyzed charts for the North Atlantic. A supplementary handbook is included hich gives the basic data for international marine weather reporting networks, communica-ons and codes (now obsolete). A minimum of space is devoted to orthodox treatment of the tmosphere, instruments, clouds, wind, etc. *Subject Headings:* **Marine meteorology, Synoptic nalysis, Textbooks.**—*M.R.*

5–12 551.5:67

Bates, C. C., **Symposium on trends and progress in applied meteorology.** *American leteorological Society, Bulletin,* 31(3):102–103, March **1950. DWB, MH-BH**—*Subject eadings:* **Applied meteorology, Symposia.**

5–13 551.501.4 551.5:697(02)

*Strock, Clifford, **Heating and ventilating engineering databook.** New York, Industrial ress, **1948.** 576 p., 193 figs., 317 tables. **DLC**—An elaborate compilation of useful data, ables, nomograms, charts, definitions, equations, formulas, and instructions for calculating ie effects of sun, temperature, humidity and wind on heat loss or gain within buildings. xtensive psychometric tables and charts; temperature, degree-day and water temperature ata and charts for scores of places in the United States; analytical solar radiation data for arious latitudes or solar angles are among the data of interest to applied climatologist or eteorologist. Specifications for water vapor, properties of air, thermometry, psychometry, nduction, convection, radiation, the heat pump, snow melting, degree-days, insolation and mfort are amply provided. *Subject Headings:* **Computation tables, Physical constants, eating and ventilating, Handbooks.**—*M.R.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

OBSERVATIONS

5–14 551.501.7:551.508.85

Kirkman, Robert A. and LeBedda, John M., **Meteorological radio direction finding for easurement of upper winds.** *Journal of Meteorology,* 5(1):28–37, Feb. **1948.** 14 figs., 4 refs., uation. **DWB**—Radio and radar equipment for tracking meteorological balloons was veloped by the U. S. Signal Corps at their Engineering Laboratories at Fort Monmouth, . J. Development of direction-finding receivers began as early as 1931, but during the war e applications of radar gave a tremendous impetus to this field of upper-air observation chnique. Various types of equipment (SCR-258, SCR-525, SCR-658 and AN/CRD-1), the ltech Aural Direction-Finder, various types of antennae and mobile ground sets are de-ribed and illustrated, along with charts showing performance and accuracy ranges. Balloons ay be tracked to over 100,000 ft. height with angular errors of the order of .05 to .15 degrees. *ubject Headings:* **Radar equipment, Upper-wind measurements.**—*M.R.*

5–15 551.501.9(04)

Whiten, A. J., **Mug's progress; an amateur equips his observatory.** *Weather,* 5(3):84–87, arch **1950.** 2 plates. **DWB, MH-BH**—*Subject Headings:* **Amateur weather stations, opular articles.**

5–16 551.506.1:551.579(058)

***Vuosikirja Årsbok, 1941–1945.** [Yearbook, 1941–1945.] Helsinki, Hydrografinen imistro, **1948.** 123+ p., 3 plates, chart in pocket, tables in Finnish and Swedish. **DWB**—views of hydrological conditions in Finland for years 1941–1945. Includes discussion of

river basins, list of gages, mean and extreme data for water levels, discharges, deviations, sno and rain stations, snow depths, precipitation, frost in ground, ice cover, etc. Charts sho water-stage curves, precipitation by years and mean precipitation. *Subject Headings:* **Observational data, Hydrology, Yearbooks, Finland.**—*M.R.*

5–17 551.506.8:551.52

Voigts, H., **Wärmestundensummen und phänologische Erscheinungen.** [Accumulate hourly temperatures and phenological phenomena.] *Archiv für Meteorologie, Geophysik u Bioklimatologie, Ser. B,* 1(3–4):410–421, **1949.** 4 figs., table, 5 refs. Summary in Germa English and French p. 410–411. **DWB, MH-BH**—Hourly accumulated temperatures abo 6°C. are calculated for three places in Germany and compared with dates of blooming of vario plants. This shows that accumulated temperatures are better than actual temperatures f bioclimatic purposes. Other plants are investigated and found to react differently accordi as their habitat is the microclimate, local climate or macroclimate (trees). The first two typ are less dependent on accumulated temperature than the third. *Subject Headings:* **Phenolog Accumulated temperatures.**—*C.E.P.B.*

5–18 551.507.2:551.508.8

Milburn, K., **Radar in ocean weather ships.** *Marine Observer,* 20(147):40–44, 55–56, Ja **1950.** 2 photos. **DWB**—*Subject Headings:* **Weather ships, Radar.**

INSTRUMENTS

5–19 551.508.21(0

Berezkin, Vl. A., **Rukovodstvo po aktinometrii dlia poliarnykh gidrometeorologicheskik stantsii, glavnogo upravleniia severnogo morskogo puti.** [Handbook for actinometry for pola hydrometeorological stations along the Northern Sea Routes.] Leningrad, Izdatel'st Glavsemorputi, **1937.** 126 p., 26 figs., 2 tables, numerous equations. (SSSR, Glavsevmorput Vsesoiuznyi Arkticheskii Institut.) **DLC**—A theoretical and practical manual for observin direct and reflected solar radiation and maintaining equipment at Arctic stations of the U.S.S.R. The types of instruments, construction and calibration of instruments, installations, correctio to be applied in each case, and the working up of records are taken up systematically an illustrated where possible. Chapter I discusses the recording of direct solar radiation by mea of the Ångström and Michelson actinometers and the Voloshina pyranograph. Chapter I treats on the measurement of total and reflected radiation, with detailed consideration of th Ianishevsky pyranometer, the Kalitin albedometer and the Arago-Devi-Kalitin actinomete *Subject Headings:* **Actinometry, Solar radiation, Manuals, Arctic.**—*M.R.*

5–20 551.508.2

Albrecht, F., **Betrachtungen über die Konstruktionsgrundlagen von Strahlungsumsatz messern und Beschreibung einer einfachen Form dieses Gerätes.** [Remarks on the principl of construction of instruments for measuring radiation balance and description of a simple for of instrument.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 1(3–4):37 387, **1949.** 11 figs., 7 refs., 7 equations. Summary in German, English and French p. 373–37 **DWB, MH-BH**—Discusses theory of radiation balance meters using thermocouples. Th linear relation between radiation balance and temperature difference of thermocouple allows comparison to be made between effect of radiation and of additional heating, so that absolu measurements can be made; a method of doing this is described. An instrument built o this principle is described, including a special method of leveling. *Subject Heading:* **Radiatio instruments.**—*C.E.P.B.*

5–21 551.508.7

Weickmann, Helmut and Bullrich, Karl, **Ein Beitrag zur Bestimmung der Sichtweite b Nacht.** [A contribution to measurement of visibility at night.] *Meteorologische Rundscha* 2(9–10): 289–290, Sept.–Oct. **1949.** 2 tables. **DWB**—Authors propose to direct cloud searc light horizontally and measure intensity in lux at 500 or preferably 1,000 m. with a photomete Conversion scales to visibility in km. given. *Subject Headings:* **Ceiling projectors, Visibility.** *C.E.P.B.*

5–22 551.508.95

Effenberger, Ernst, **Beschreibung eines einfachen Geräts zur Messung des Oxydationsvertes oder dessen Faktoren und des Staubgehaltes der Luft.** [Description of a simple pparatus for the measurement of the oxidation power or its factors and of the dust content of he air.] *Meteorologische Rundschau*, 2(9–10):280–283, Sept.–Oct. **1949.** 4 figs. **DWB**—Constant volume of air is drawn through a glass tube against a moist filter paper impregnated vith a substance which darkens or colors on oxidation (several mentioned). Evaluation is hotometric, or by comparison with a color scale, standardized by Cauer's method (1935) and hould be corrected for relative humidity. One measurement takes five minutes. Measures O_3 and NO_2; can be modified to give dust content. *Subject Heading:* **Oxidation meter, Turidity meters.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

5–23 551.509.2

Scherhag, Richard, **Die Umgestaltung der täglichen Wetterkarten.** [The rearrangement f the daily weather chart.] *Meteorologische Rundschau*, 2(7–8):232–234, July–Aug. **1949.** ef. **DWB**—Changes on Jan. 1, 1949, in chart issued in U.S. Zone described. *Subject Headngs:* **Weather charts, Germany.**

5–24 551.509.3:551.509.8

Galmarini, Alfredo, **Predicciones meteorológicas: pronosticadores, profetas y adivinadores.** [Meteorological predictions: forecasters, prophets and soothsayers.] *Boletin de Estudios Geográficos*, [Mendoza] 1(2):11–34 1st quarter **1949. DLC**—A long, general discussion of the istory, present status, and problems of forecasting, with special reference to the scientific and noral obligations of the meteorologist in taking the service from the realm of pseudo-science, oth in fact and in the minds of the public. The author is Chief of the Argentine weather ervice and President of the South American Regional Commission of the I.M.O. *Subject Headings:* **Weather forecasting, Weather lore.**—*M.R.*

5–25 551.509.33

Flohn, Hermann and Hess, Paul, **Grosswetter-Singularitäten im jährlichen Witterungsverauf Mitteleuropas.** [Broad-weather singularities in the annual variation of weather in central Europe.] *Meteorologische Rundschau*, 2(9–10):258–263, Sept.–Oct. **1949.** table. **DWB**—Using Baur's (1947) broad-weather types and unpublished revision by Hess and Brezowski, uthors compare recurrences of 14 types near same dates in at least ⅔ of years 1881–1947 with ecurrences of "singularities" defined as winter and summer monsoons and autumn fine periods. Spring has no stable recurrences. Nearly all important singularities are confirmed; 14 recurred n 67–89% of years with durations of 3 to 12 days and dating errors up to 5 to 6 days. Only of se for forecasting if independently supported. *Subject Headings:* **Singularities, Long range orecasting, Central Europe.**—*C.E.P.B.*

5–26 551.509.33(54)

Banerji, S. K., **Methods of foreshadowing monsoon and winter rainfall in India.** *Indian Journal of Meteorology and Geophysics*, 1(1):4–14, Jan. **1950.** fig., 3 tables. **DWB**—A general iscussion of the organized efforts at long range forecasting in India since 1886, when the Meteorological Department began making seasonal forecasts. Data on normal, extreme and uantity rainfall amounts for various provinces of India are included for the purpose of defining he forecast intervals. The method developed by Sir Gilbert Walker is used at present for easonal forecasts. Different factors used in making such forecasts are listed: mainly correlaions of pressure, temperature and rainfall at "key" places such as Mauritius, Batavia, Port Darwin, Dutch Harbor, Rhodesia or South America with subsequent conditions in India. Correlations with five major districts in India, for 1919–1946, show accuracy of method and imitations. Cases where deviations were large are analyzed. Need for greater localization ited. *Subject Headings:* **Seasonal forecasting, Monsoon, India.**—*M.R.*

5–27 551.509

†Inwards, Richard, **Weather lore taken from the world's literature and the age-old wisdo of farmers, mariners, bird watchers . . . concerning flowers, plants, trees, butterflies, bird animals, fish, tides, clouds, rainbows, stars, mock suns, mock moons, haloes. . . .** Lond (Rider), 4th ed. rev. and amplified for the Royal Meteorological Society by E. L. Hawke, 195 vi+251 p., 9 cloud plates. (Biographical note and photo of R. Inwards.)—Preface discuss briefly reliability of prognostics. Body of work gives quotations, prognostics and oth popular proverbs arranged under: weather in general; times and seasons; sun, moon and sta wind; clouds; mists; haze; dew; fog; sky; sound; sea; heat; rain; rainbow; frost; thunder a lightning; barometer, thermometer etc.; animals, birds, fishes, etc.; reptiles, insects, plants, e Bibliography of weather lore and good index. *Subject Heading:* **Weather lore.**—*C.E.P.B.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

5–28 551.510:629.

†Roberts, Howard E., **The earth's atmosphere.** *Aeronautical Engineering Review*, 8(10):1 31, Oct. 1949. 16 figs., fold-in chart, 41 refs. **DLC, DWB**—A systematic review of the lat knowledge and theories concerning the physical properties of the atmosphere, beginning with discussion of the aerodynamic and thermodynamic theory, methods of observation and d termination of characteristics and then taking up the various characteristics in detail: gener structure, composition, temperature and pressure distribution, winds, cloud formatio electrical and acoustical phenomena, auroras, etc. Single diagrams illustrate the variations each characteristic, and a beautiful fold-in chart integrates the entire field of knowledge of t atmosphere up to 1,000 miles above sea level (pressure, temperature, speed of sound, win clouds, auroras, meteors and man's accomplishments). There is an extensive bibliography the subject. *Subject Headings:* **Upper atmosphere, Atmospheric structure, Aeronautics.** —*M.*

5–29 551.510.4

Axford, D. W. E., Sawyer, K. F., and Sugden, T. M., **The physical investigation of certa hygroscopic aerosols.** *Royal Society of London, Proceedings, Ser. A*, 195(1040):13–33, 194 19 figs., 4 tables, 15 refs. **DLC**—Experimental work, with simple hygroscopic screening smok ($TiCl_4$, SO_3,) using optical density measurements and checking results by sedimentati methods (using the Schaefer sedimentation apparatus), indicates that a much greater optic density occurs at high than at low relative humidities. More complex smokes studied critical It is possible, though difficult, to control particle size of smoke ejected. *Subject Heading* **Atmospheric pollution.**—*M.R.*

5–30 551.510.

†Schneider-Carius, Karl, **Grundschicht und Kaltluft.** [Surface layer and cold air *Meteorologische Rundschau*, 1(11–12):360–362, May-June **1948.** 21 refs. **DWB**—*Subj Heading:* **Atmospheric structure.**

5–31 551.508.25:551.508.952:551.510.53

†***Ozon, Berichte des Deutschen Wetterdienstes in der US-Zone, Nr. 11.** [Ozone, Repor of the German Weather Service in the US-Zone, No. 11.] Bad Kissingen, Deutscher Wette dienst in der US-Zone, **1949.** 71 p., 57 figs., 14 tables, refs. **DWB**—Part I consists of collection of contributions to a special discussion on 17–18 April 1944. Contents: O. Hoelpe **Überblick über die Ozonarbeiten beim Arbeitskreis Meteorologie.** [Summary of work o ozone in the sphere of meteorology], p. 3–7. F. W. P. Götz, **Der Stand des Ozonproblem** (Frühjahr 1944). [The position of the ozone problem, (spring, 1944)], p. 7–13. E. Schröe **Theorie der Entstehung, Zersetzung und Verteilung des atmosphärischen Ozons.** [Theor of origin, destruction and distribution of atmospheric ozone], p. 13–23. A synthesis of th known distribution of ozone, cycle of chemical reactions, absorption of radiation and relation with pressure, temperature, wind and turbulence, up to 30–50 km. K. O. Kiepenheue **Gesetzmässigkeiten der Ultraviolett-Strahlung der Sonne.** [Regularities of ultraviol

radiation of the sun], p. 23–25. J. Bartels, **Erdmagnetisch gemessene Schwankungen der Ultraviolettstrahlung der Sonne.** [Variations of ultraviolet radiation of the sun measured by terrestrial magnetism], p. 25–26. A. Ehmert, **Über das troposphärische Ozon.** [On tropospheric ozone], p. 26–28. Moser, **Ozon und Wetterlage.** [Ozone and weather situation], p. 28–37. Connection between ozone value and origin of air in higher layers, variations with time of year and latitude. Penndorf, **Die Temperatur der Ozonschicht.** [The temperature of the ozone layer], p. 38–40. Ritschl, **Instrumentelle Fragen der Ozonmessung.** [Instrumental problems of ozone measurement], p. 40–44. Stranz, **Entwicklung der Ozonradiosonde.** [Development of ozone radiosonde], p. 45–46. Part II, Erich Regener, **Ozonschicht und atmosphärische Turbulenz.** [Ozone layer and atmospheric turbulence], p. 47–57. Normal distribution at various levels and variations in different weather situations. Part III, Alfred and Hedwig Ehmert, **Über den Tagesgang des bodennahen Ozons.** [On the diurnal variation of ozone near the ground], p. 58–62. Opposition between variations of ozone and relative humidity. Part IV, Alfred Ehmert, **Über den Ozongehalt der unteren Atmosphäre bei winterlichem Hochdruckwetter nach Messungen.** [On the ozone content of the lower atmosphere in winter anticyclones according to measurements], p. 63–66. Part V, Alfred and Hedwig Ehmert, **Über die chemische Bestimmung des Ozongehaltes der Luft.** [On the chemical determination of the ozone content of the air], p. 67–71. *Subject Headings:* **Ozone, Ozone layer, Ozone Meters, Symposia.**—*C.E.P.B.*

5–32 551.510.535

Jones, M. W. and Jones, J. G., **Tidal effects in the ionospheric F-layer.** *Journal of Meteorology*, 7(1):14–20, Feb. **1950.** 14 figs., 12 refs., 14 equations. **DWB**—Solar and lunar diurnal and semi-diurnal tides in the thickness of the ionospheric F-layer at College, Alaska (near Fairbanks) observed during the winter of 1948–1949 are analyzed, discussed and illustrated by numerous graphs. Methods of harmonic analysis, and theoretical considerations are treated. The diurnal lunar wave is found to be the most pronounced at this latitude (64°N), and the sign of this wave corresponds to the sign of the lunar declination. *Subject Heading:* **Ionospheric tides.**—*M.R.*

MECHANICS AND THERMODYNAMICS

5–33 551.511:551.46

Deacon, G. E. R., **Energy exchange between the oceans and the atmosphere.** *Nature*, [London], 165:173–174, Feb. 4, **1950. DWB** -Report of discussion at Royal Astronomical Society, October 28, 1949. *Subject Headings:* **Turbulent exchange, Dynamics of the atmosphere, Oceanography.**

5–34 551.511

Lorenz, Edward N., **Dynamic models illustrating the energy balance of the atmosphere.** *Journal of Meteorology*, 7(1):30–38, Feb. **1950.** 3 figs., 6 refs., 27 equations. **DWB, DLC, MH-BH**—The generalized vorticity equation (obtained by eliminating pressure from the equations of motion for a two-dimensional spherical atmosphere) is compared with the simple vorticity equation (which ignores density variations and friction). Density and wind fields are assumed to rotate intact around the earth, converging near the pole, and permitting the definitions of models of polar air masses, or even of the general circulation. Only in special cases is there any similarity between the models with friction and those ignoring friction. In a simple case where the coldest air was at the pole, the coldest winds from the northeast, and the warmest from the southwest, it was found that heating was strongest in the northwest winds and cooling in the southeast. The energy balance and its maintenance is taken up theoretically, and such distribution of heating and cooling assumed to be the principal factor in maintaining the general circulation. *Subject Headings:* **Atmospheric circulation, Dynamics of the atmosphere, Vorticity equations.**—*M.R.*

5–35 551.511

Möller, F., **Eine Berechnung des horizontalen Grossaustausches über dem Atlantischen Ozean.** [A computation of the large scale horizontal *Austausch* over the Atlantic Ocean.]

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A, 2(1):73–81, **1950.** 2 figs., refs. Summary in German, English and French p. 73–74. **MH-BH**—The author compile and presents two charts of the North Atlantic Ocean (for January); the mean meridional an zonal *Grossaustausch* or macro-exchange for the layer from the surface to 3,000 m., and for th surface respectively, as determined from the relation between the west-east and the nort south components of the wind. The calculations are based on the use of the *transmissio coefficient of heat* α instead of the mixing length (Mischungsweg). Thus the *Austausch* represented by the equation $A=\rho/\alpha(V'^2)_m$ (where V' is the turbulent velocity vector). Th horizontal *Grossaustausch* is computed by using α mean value $\bar{\alpha}=2.4\times10^{-5}$ sec^{-1}. Thi method is extremely useful since the monthly mean wind velocities (taken from mean chart of the oceans) can be used in computing the mean of the meridional and zonal *Austausch Subject Headings:* **Dynamics of the atmosphere, Turbulent exchange, North Atlantic Ocean.** — *M.R.*

5–36 551.51

Pasquill, F., **Meteorological Office discussion. The turbulent exchange of water vapour heat and momentum near the ground.** *Meteorological Magazine*, [London], 79(933):81–85 March **1950. DWB**—Pasquill described investigations at Cambridge, England, to establis methods of deriving local rate of evaporation from a land surface by examination of turbulen exchange and energy exchange near the ground. Eddy diffusivity for momentum agrees wit that for water vapor K_v in adiabatic conditions. In unstable conditions eddy diffusivity o heat K_h is greater than that of vapor, so that conventional heat balance method of estimating evaporation, assuming $K_v=K_h$, may lead to overestimates. *Subject Heading:* **Turbulen exchange.**

5–37 551.511

Van Mieghem, Jacques, **Sur le mouvement isobarique de l'air atmosphérique.** [On the isobaric movement of atmospheric air.] *Archiv für Meteorologie, Geophysik und Bioklima tologie, Ser. A*, 2(1):65–72, **1950.** 5 refs., 11 equations. Summary in French, German and English p. 65–66. **MH-BH**—For studying the isobaric motion of air, it is expedient to write the equations of atmospheric dynamics with the variables x, y, p and t where x and y expres the horizontal co-ordinates, p the pressure and t the time. When the motion of the air is conducted along the isobaric surfaces, then the isobaric divergence of the horizontal field of current is zero, and the vertical component of the absolute isobaric vortex is an invariant of the motion and the equation of the baric tendency is getting the form of an equation of transport. It is possible to establish an equation with partial derivatives of the geopotential of the isobaric surfaces. This equation has a relatively simple form in case of an isobaric motion composed of a permanent zonal flow and an isobaric perturbation. In this particular case we find for the speed of propagation of undulations of the western horizontal current an analogous formula to the one drawn up by Rossby, but applicable in this case to a baroclinic atmosphere and an isobaric perturbation. *Subject Heading:* **Mechanics of the atmosphere.**—*Author's abstract.*

GENERAL CIRCULATION

5–38 551.513:551.515.7

Elliott, Robert D., **Study of the blocking-action weather process.** *American Geophysical Union, Transactions*, 29(6):773–776, Dec. **1948.** 7 refs. **DWB**—A summary of the most important conclusions which were drawn from the ONR-CIT research project on blocking-action in the general circulation of the Northern Hemisphere. Detailed statistical studies were made from the 40 years of U. S. Weather Bureau charts, and independent studies of eddy-viscosity, diffusion of momentum and heat and broad-scale lateral turbulence to determine the causes of blocking. It was found that blocking occurred most often in the East Pacific and East Atlantic, that there was a 12 to 14 year period which represented a climatological swing of similar period but not always in phase with the solar cycle. Eight rules were formulated for predicting the inception of blocking-action, but the causes remain obscure. (For abstract of **Final Report on Blocking Action,** see *American Meteorological Society, Bulletin*, 29(10):541, Dec. **1948**—item 48-28.) *Subject Headings:* **Blocking action, General circulation.**—*M.R.*

5–39 551.513:551.583.3

Viete, Günter, **Das Problem der allgemeinen Zirkulation im Diluvium (I).** [The problem of the general circulation in Diluvium (I).] *Zeitschrift für Meteorologie*, 3(3):65–72, March 1949. 3 figs., 26 refs. **DWB**—*Subject Headings:* **Atmospheric circulation, Geological climates.**

5–40 551.513.1:551.557

§Cressman, George P., **Variations in the structure of the upper westerlies.** *Journal of Meteorology*, 7(1):39–47, Feb. 1950. 8 figs., 11 refs. **DWB, DLC, MH-BH**—The latitudinal, longitudinal, height and speed variations of the jet stream are studied and illustrated by means of meridional cross sections and high level charts of baric topography for a number of situations in North America and the Atlantic region. In almost every case there was a double maximum (two jet streams in different latitudes), and sequences of charts show these maxima drifting toward the south, with a new maximum appearing in the north about the time an old one disappeared in the south. Distinct jet streams with high speeds (and occurring at higher elevations) were more prevalent in southerly latitudes than in northerly. The horizontal extent and time variations in the position of the maxima are discussed. *Subject Headings:* **Atmospheric circulation, Jet stream, Upper air winds.**—*M.R.*

5–41 551.513.1

§Hess, Seymour L. and Wagner, Harold, **Atmospheric waves in the northwestern United States.** *Journal of Meteorology*, 5(1):1–19, Feb. 1948. 28 figs., 2 tables, 19 refs., equations. **DWB**—The effect of a mountain barrier on air flow and travelling depressions is studied by means of cross sections and charts made from upper-air soundings between Tatoosh Island, Washington and Minneapolis, Minnesota. The first part takes up internal waves induced by the Rocky Mountains, including a thorough treatment of flow patterns and associated weather phenomena and implications for isentropic analysis. The second section is devoted to pressure waves and lee cyclogenesis. Fast moving pressure waves are given special consideration; their explanation being found in connection with the large number of old occlusions (without fronts) which impinge on the West Coast and do not regenerate as frontal systems until far east of the Divide. *Subject Headings:* **Orographic effects, Waves in the westerlies, Cyclogenesis, Pacific Northwest.**—*M.R.*

5–42 551.513.1

§Palmén, Erik, **On the distribution of temperature and wind in the upper westerlies.** *Journal of Meteorology*, 5(1):20–27, Feb. 1948. 6 figs., 11 refs., 10 equations. **DWB, DLC**—A fundamental paper on the existence and nature of the narrow band or "meandering" river of strong westerly winds in middle latitudes which exists on daily upper-air charts and cross sections, but does not show up on mean monthly charts. Radiosonde data for all of North America are used to demonstrate or derive the temperature-wind characteristics and stability of the "jet stream" and its relation to air masses, tropopause surfaces and vertical motions in the stratosphere. It is shown that the stratosphere is very cold (−70°C.), in winter over the Arctic, whereas between 50° and 60°N. the highest temperatures occur (similar conditions have been found over Europe). There is a zone of lowest temperature about 4° of latitude south of the "jet stream" zone and the zone of highest temperature is about 7° north of this zone. Meteorological Office discussion (see *Meteorological Magazine*, [London], 78(919):16–23, Jan. 1949). *Subject Headings:* **General circulation, Jet stream, Synoptic-aerological studies.**—*M.R.*

ATMOSPHERIC DISTURBANCES

5–43 551.515.11

§Spar, Jerome, **Synoptic studies of the potential energy in cyclones.** *Journal of Meteorology*, 7(1):48–53, Feb. 1950. 12 figs., 11 refs., 4 equations. **DWB, DLC, MH-BH**—The author claims to have refuted Margules' energy theory of cyclones both by logic and by calculations of the energy changes in two series of cyclonic storms moving from the Great Plains to the Great Lakes. The conclusion is that deepening and intensification of a cyclone may be accompanied by a net increase of potential energy/mass; and conversely, filling and weakening, by a net decrease of potential energy/mass in the vicinity of a storm. Surface synoptic charts

and charts showing local changes of potential energy/mass over the eastern U. S. A. are included for the six periods analyzed. *Subject Headings:* **Dynamics of the atmosphere, Margules theory, Synoptic studies.**—*M.R.*

5–44 551.515.11

Truesdell, C., **The effect of viscosity on circulation.** *Journal of Meteorology*, 6(1):61–62 Feb. **1949.** 8 refs., 9 equations. **DWB**—A short theoretical treatment of the problem presented by the apparent inability of steep viscosity gradients to generate vorticity. It is found that the velocity as well as the viscosity must vary from point to point in order for extraneous forces to modify the circulation through the medium of viscosity. Based on work of Duhem (1901) and Bjerknes (1898–1902). *Subject Headings:* **Hydrodynamics, Atmospheric viscosity.**—*M. R.*

5–45 551.515.2:551.507.2

Mironvitch, V., **La météorologie tropicale et le "Carimaré."** [Tropical meteorology and the "Carimaré."] *La Météorologie*, 4^e^ série, 14:101–106, April–June **1949.** 3 figs., 4 refs. Summary in French and English p. 101. **DWB**—A general discussion of current theories based on the American edition of "Tropical Meteorology," on evidence (sometimes contradictory) from the data obtained on the "Carimaré" weather ship, or on radar photographs, etc. Special note is taken of ideas on the Intertropical Convergence Zone (ICZ in English, LIC in French), easterly waves in the trade wind belt (O.P.A. in French), and the structure of the tropical cyclone. The author claims the latter is usually eccentric. *Subject Headings:* **Tropical meteorology, Weather ships, Hurricanes, Tropical cyclones.**—*M.R.*

5–46 515.515.8

§Meyer, Hans Klaus, **Aufbau und Bewegung eines Kaltlufttropfens in Nordrussland.** [Structure and movement of a cold air mass in North Russia.] *Meteorologische Rundschau*, 2(7–8):208–217, July–Aug. **1949.** 4 figs., 6 charts, table, 3 refs. **MH-BH**—Cold air mass on Jan. 1 to Feb. 5, 1947 over snow covered surface investigated. Charts show surface isobars and isotherms and thickness lines 500/1,000 mb.; the isobars give no indication of a deep layer of cold air, showing that horizontal gradient of temperature was greatest near surface. There was an upglide snow region in rear with a well-developed warm tongue at all heights. Movement was due to gradient wind component of surface isobars modified by vertical motion. Steering was due to mutual effect of surface pressure and upper low, and stratospheric steering of both. *Subject Headings:* **Air mass movements, U.S.S.R.**—*C.E.P.B.*

5–47 551.515.8

Penndorf, R., **Die Struktur der Kaltfront am 18 Mai 1944 in Ost-Europa und besonders im Karpatenraum.** [The structure of the cold front on May 18, 1944 in east Europe and especially in the Carpathian area.] *Zeitschrift für Meteorologie*, 3(5–6):140–143, May–June **1949.** 3 figs. **DWB**—On May 18, a stationary cold front resumed its eastward motion. Upper air data showed that besides the surface cold front, an upper cold front advanced eastwards, passing over the Alps, and on May 18 overtook the surface front and lay 100–150 km. beyond it. This reactivated the latter. *Subject Headings:* **Cold fronts, Carpathians.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

5–48 551.521.11:634.8

Unckrich, A., **Einfluss der Witterung auf den Ertrag verschiedener Rebsorten.** [Influence of weather on the yield of various sorts of vines.] *Wetter und Klima*, 2(3–4):104–111, March–April **1949.** 3 tables. **DWB**—Yields of five vine stocks at Neustadt in 1927–1942 compared with sunshine June–December of previous year (normal 1,041 hrs.) and May–August of harvest year (normal 939 hrs.). In all cases sunshine above normal previous year favored harvest. Three stocks did best with excess sunshine in harvest year, two were indifferent. *Subject Headings:* **Agricultural climatology, Viticulture.**—*C.E.P.B.*

5–49 551.521.3:551.593.54

†*Schüepp, W., **Die Bestimmung der Komponenten der atmosphärischen Trübung aus ktinometermessungen.** [The determination of the components of atmospheric obscuration rom actinometer measurements.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, er. B*, 1(3–4):257–346, **1949.** 26 figs., folding plate, 49 tables, 87 refs., 80 equations. Summary in German, English and French p. 257–260. **DWB, MH-BH**—The main sources of loss f solar radiation are: molecular scattering, scattering by particles in the atmosphere, selective bsorption by various gases. Rayleigh's well known formula for molecular scattering is given, odified by Cabannes as $.00386\lambda^{-4.05}$. Estimation of loss by aerosols is represented by uthor's modification (17) of Ångström's formula, with constants α and B, the latter varying ith wave-length. These constants are determined from observations with and without lters, and part II discusses in detail the instrumental corrections required. Part III deals with ne graphical determination of the obscurity constants α, B and w (precipitable water) from ctinometer measurements in three bands. Tables 27–31 give data for calculating values of adiation intensity in different wave-lengths with different values of obscuration, different lters, etc. Corrections for ozone and water vapor are given. Part IV deals with the evaluaon of the various obscuration factors, including effect of fronts, inversion, convection, etc.; nd calculations based on a large number of observations at Davos. Author considers that his ork enables the intensity of solar radiation to be determined for all wave-lengths from 0.35–.0μ for all pressures and solar heights, given the extraterrestrial intensity of the wave-length ot yet completely known), from observations with various types of actinometers. *Subject Headings:* **Actinometry, Scattering, Turbidity.**—*C.E.P.B.*

5–50 551.521.64

Höcker, K. H., **Die Komponenten der kosmischen Strahlung und ihre Intensitäten in der tmosphäre.** [The components of cosmic radiation and their intensities in the atmosphere.] *nnalen der Physik*, 6(6):353–364, **1949.** fig., 14 equations. **DWB**—Components of cosmic adiation are protons, neutrons, neutral and charged mesons, electrons, photons. The energy pectrum of protons and the origin of the different components are discussed. Finally, the ntensity of the components is summarized as a function of height in the atmosphere. *Subject Heading:* **Cosmic radiation.**—*C.E.P.B.*

5–51 551.521.64

Bagge, Erich, and Fincke, Karl, **Die Intensitätsverteilung der Höhenstrahlungsneutronen n der Atmosphäre.** [The intensity distribution of high-level radiation neutrons in the tmosphere.] *Annalen der Physik*, 6(6):321–337, **1949.** 4 figs., 3 tables, 45 equations. **DWB** –The distribution is calculated theoretically and found to reach a maximum intensity at 20–2 km., agreeing with the experimental determination of Yuan. *Subject Heading:* **Cosmic adiation.**—*C.E.P.B.*

TEMPERATURE

5–52 551.524

Schneider-Carius, Karl, **Der Inversionstyp der Grundschicht.** [The inversion type of urface layers.] *Meteorologische Rundschau*, 1(7 8):226–228, Jan.-Feb. **1948.** 4 figs., 2 ables, 3 refs. **DLC**—*Subject Heading:* **Temperature inversions.**

5–53 551.524.2:551.586.61

Tollner, Hans, **Der Einfluss grosser Massenerhebungen auf die Lufttemperatur und ie Ursachen der Hebung der Vegetationsgrenzen in den inneren Ostalpen.** [The influence of rge mountain massifs on the air temperature and the causes of the rise of the vegetation mits in the inner eastern Alps.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. 3*, 1(3–4):347–372, **1949.** 4 figs., 10 tables, 45 refs. Summary in German, English and French . 347–348. **DWB, MH-BH**—The assumption of a vertical temperature gradient of 0.5°C. er 100 m. is incorrect in eastern Alps. Temperature gradients over various height stages etween neighboring stations are tabulated and found to change from about 0.4°C. per 100 m. elow 1,000 m. above sea level to 0.62 above 1,600 m. In winter they are small but very

variable; maximum gradients in June and July. Screen temperature at 7h. at mountai stations is up to 2.3° lower than neighboring free-air temperature at same level. The hig upper tree limit in central compared with northern Alps is attributed to southern position, les snow and wind, deeper soils and readier drainage of cold air. *Subject Headings:* **Orographi effects, Temperature distribution, Ecoclimatology.**—*C.E.P.B.*

5–54 551.524.7:551.515.127(54

*§Ananthakrishnan, R., **On the changes in the thermal structure of the atmosphere ove Agra associated with the passage of a western disturbance in winter.** *Indian Journal o Meteorology and Geophysics*, 1(1):45–52, Jan. **1950.** 3 figs., 4 tables, 3 refs. **DWB**—Upper-ai soundings made at Agra during the period Jan. 2 to 11, 1938, are analyzed and data presente in tables and graphs. A westerly disturbance was associated with large fluctuations of tem perature at the tropopause level (16 km.), which are ascribed to horizontal oscillations of th atmosphere of the type studied by Bjerknes, (V. and J.), Solberg and Bergeron (1933). *Subjec Headings:* **Upper air temperature, Synoptic-aerological studies, Tropopause, India.**—*M.R.*

5–55 551.524.

*Nagabhushana Rao, K., **Distribution of saturation potential temperature(θ_s) with heigh and latitude.** *Indian Journal of Meteorology and Geophysics*, 1(1):17–23, Jan. **1950.** 2 figs 4 tables, 5 refs., equation. **DWB**—From long records made at 15 sounding balloon stations i various parts of the Northern Hemisphere, and from shorter records made at 30 radiosond stations in the U.S.A., Alaska, Hawaii and the Caribbean, tables and charts of θ_s are presente for summer (July and August), and for winter (Dec.–Feb.) for levels up to 18 gkm. Above th tropopause data are extrapolated under the assumption of zero mixing ratio. On the chart two shaded areas show the latitudes and altitudes where entropy decreases with height (are of convective instability) and areas where $\theta_s \leq$ surface values. The latter area, incidentally nowhere extends into the stratosphere. *Subject Headings:* **Upper air humidity, Aerologica data, Northern Hemisphere.**—*M.R.*

5–56 551.515.83:551.525.2

†Reuter, H., **Die Modifikation einer Luftmasse durch die nächtliche Abkühlung de Erdoberfläche.** [The modification of an air mass by the nocturnal cooling of the earth' surface.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 1(2):252–263, **1948** 4 figs., 2 tables, 11 refs., 21 equations. Summary in German, English and French p. 252–253 **MH-BH**—Calculates cooling of air near ground after 6 and 12 hours, neglecting cooling by radiation from air and assuming constant eddy conductivity. Modifications by radiative cooling of air are then investigated, but only special cases are manageable. *Subject Headings* **Air mass modification, Nocturnal cooling.**—*C.E.P.B.*

ATMOSPHERIC PRESSURE AND WIND

PRESSURE

5–57 551.54

†Clark, R. D. M., **Atmospheric micro-oscillations.** *Journal of Meteorology*, 7(1):70–75 Feb. **1950.** 2 figs., 8 tables, 16 refs. **DWB, DLC, MH-BH**—Conclusion is reached tha atmospheric turbulence at low levels is an important source of microbarometric oscillations Ample evidence exists that Haurwitz's conclusion is correct: namely, that internal waves and convective elements are to the same order of magnitude in horizontal dimension. Also the convective cell theory of Brunt and Byers is substantiated by data obtained from electro-magnetic microbarographs. *Subject Headings:* **Micro-barometric oscillations, Convective cells, Microbarographs.**—*M.R.*

5–58 551.543:551.577

Noth, Hermann, **Luftdruckänderung durch Niederschlag.** [Change of air pressure by precipitation.] *Meteorologische Rundschau*, 1(7–8):210–212, Jan.–Feb. **1948.** 3 figs. **DLC**— *Subject Headings:* **Pressure changes, Precipitation.**

5–59 551.515.11:551.543:551.509.312

Sieber, Peter, **Vertikalbewegungen und Luftdruckänderungen.** [Vertical motion and atmospheric pressure change.] *Meteorologische Rundschau*, 1(11–12): 322–329, May-June 1948. 5 figs., 4 charts, 11 equations. Summary in German and English p. 322. **DWB**—Procedures in computation of vertical motions and advection resulting in surface pressure changes, followed by construction of fictitious prognostic chart. *Subject Headings:* **Mechanics of the atmosphere, Pressure changes, Prognostic charts, Vertical motion.**—*M.R.*

5–60 551.543.1:551.582.3(267)

Great Britain. Meteorological Office, **Monthly meteorological charts of the Indian Ocean.** London, H. M. Stationery Office, 1949. 97 p. ([Great Britain] Meteorological Office. Marine Branch.) At head of title: M. O. 519. **DWB, MH-BH**—Monthly charts (30°N.–30°S., 20–120°E.) comprise: cyclone tracks, frequency of winds of gale force, predominant direction, constancy and force of winds, resultant winds; barometric pressure; wind roses for 5° squares; frequency and direction of swell; maximum, minimum range and mean air and sea temperatures and air minus sea; frequencies of fog, mist and haze, lightning, snow, precipitation; mean cloudiness; frequency of clear, cloudy and overcast skies. Introduction includes table of diurnal variation of pressure 20°N. to 20°S. *Subject Headings:* **Climatic charts, Climatological data, Indian Ocean.**

5–61 551.547(54)

Hariharan, P. S., **The normal 17 hrs. monthly contours corresponding to the 850 mb. and 700 mb. isobaric surfaces over India.** Calcutta, Government of India Press, 1949. 7 p., 24 plates (at end of article), 2 tables. At head of title: India Meteorological Department. Scientific Notes, Vol. XI, No. 131. **DWB**—*Subject Headings:* **Upper air pressure, India.**

WIND

5–62 551.553.12

Cross, C. M., **Slope and valley winds in the Columbia River Valley.** *American Meteorological Society, Bulletin*, 31(3):79–84, March 1950. 3 figs., 6 refs. **DWB, MH-BH**—Analysis of wind records made during 1938–1940 in the Columbia River Valley near Trail, British Columbia, to determine the diurnal wind patterns. By using two stations, one in the main valley and one in a side valley, the valley winds and slope winds could be studied and the results compared with those from similar studies made in the Alps. The most pronounced patterns occurred on sunny days in summer when the gradient winds were weak. *Subject Headings:* **Mountain and valley breezes, Slope winds, British Columbia.**—*M.R.*

5–63 551.555.3

Hader, F., **Der Föhn im Raum von Lunz am See am 27. Februar 1947.** [The occurrence of föhn in the region of Lunz Lake on Feb. 27, 1947.] *Geographische Gesellschaft, Wien, Mitteilungen*, 89(7–12):142–143, 1946. **DLC**—During a föhn the temperature rose from −22.7° to 8.8°C., or 31.5°C. (57°F.) and the humidity dropped to 35%. Table gives 3-hourly meteorological data for Lunz am See for period from 06h. to 21h. *Subject Headings:* **Föhn winds, Austria.**—*M.R.*

5–64 551.555.3

Loewe, F., **Foehn effects near the Balleny Islands, Antarctica.** *Weather*, 5(4):152–154, April 1950. 2 photos. **DWB, MH-BH**—Description of "fall clouds" in lee of islands, föhn gaps in clouds and wave motion forming bars of cloud and clear lanes parallel to length of islands. *Subject Headings:* **Föhn effects, Balleny Islands, Antarctica.**

5–65 551.511:551.558.29

Schmitz, Hans Peter, **Zur Ermittlung der Vertikalbewegung infolge Bodenreibung aus dem Druckfeld.** [On the estimation of vertical motion resulting from ground friction in the pressure field.] *Meteorologische Rundschau*, 2(7–8):193–196, July–Aug. 1949. fig., table, 11 refs., 21 equations. **MH-BH**—Criticism of a work by Lettau (1948) which is not strictly

applicable at high levels. A qualitative estimate of effect of acceleration is given but there are many difficulties. *Subject Headings:* **Mechanics of the atmosphere, Vertical motion.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

WATER VAPOR AND CLOUDS

5–66 551.571.31

Rathschüler, Elisabeth, **Über die Änderung des Tagesganges der Luftfeuchtigkeit mit der Höhe im Gebirge.** [On the change of diurnal variation of atmospheric humidity with height in mountains.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 1(1):17–31, **1948.** 4 figs., 6 tables, 3 refs. Summary in German, English and French p. 17–18. **MH-BH**—Diurnal variation of relative humidity, vapor pressure and specific humidity examined at four neighboring stations in Salzach (895–2,007 m.) and Sonnblick (3,106 m.) on fair days. With increasing height, R. H. shows reduction of afternoon minimum and reversal at Sonnblick; double oscillation of vapor pressure gives place to single evening maximum. Results quantitatively explained by evaporation and convection. *Subject Headings:* **Humidity variations, Austria.**—*C.E.P.B.*

5–67 551.571.31:551.575

Perl, Gertrud, **Die relative Feuchtigkeit an Tagen mit Hochnebeldecke über dem schweizerischen Alpenvorland.** [The relative humidity on days with a high fog sheet over the Swiss Alpine foreground.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 1(2):207–210, **1949.** 3 tables. Summary in German and English p. 207. **MH-BH**—With anticyclonic weather, widespread stratus is frequent in N. Switzerland, especially in winter. Cloud sheet mostly between 600–800 and 1,000 m. above M.S.L. Mean daily R. H. on such days in 7–16% above normal for date and place when station is in cloud or less than 100 m. below it. *Subject Headings:* **Humidity variations, Fog, Switzerland.**—*C.E.P.B.*

5–68 551.571.7:551.513.2

Reichel, Eberhard, **Zum Dampfgehalt und Wasserkreislauf der Atmosphäre.** [On vapor content and water circulation of the atmosphere.] *Meteorologische Rundschau,* 2(7–8):206–208, July–Aug. **1949.** 4 tables, 21 refs. **MH-BH**—Specific humidity and weight of water vapor in 15°N.30°W. from aerological observations compared with those by Süring's formula show abnormal decrease above 1 km. This is characteristic for trades. The atmospheric circulation model is provisionally corrected accordingly. *Subject Headings:* **Upper air humidity, Atmospheric circulation.**—*C.E.P.B.*

5–69 551.573:551.578.46

*Kaitera, Pentti, **The evaporation from snow.** International Union of Geodesy and Geophysics, Association Internationale d'Hydrologie Scientifique, Comptes Rendus des Séances, Réunion de Washington, **1939.** II, Commission des Neiges, Question 2, Rapport 2. 10 p., 3 figs., 6 tables, 3 refs. **DWB**—Evaporation measurements made in Helsinki at the Ilmala Observatory in 1937 and 1938. *Subject Headings:* **Evaporation, Snow cover, Helsinki, Finland.**

5–70 551.574.2:551.576.1

Prügel, Heinrich, **Vorverlegung eines Cirrostratus-aufzuges durch Kondensstreifen.** [Extension of a cirrostratus train by condensation streaks.] *Meteorologische Rundschau,* 2(9–10):290, Sept.–Oct. **1949. DWB**—Sheet of Ci-st spread rapidly during air battle at 9,000 m. over Balkans and gave halo complex. *Subject Headings:* **Condensation trails, Artificial condensation.**—*C.E.P.B.*

5–71 551.576:551.591

†aufm Kampe, H. J., **Visibility and liquid water content in clouds in the free atmosphere.** *Journal of Meteorology,* 7(1):54–57, Feb. **1950.** 6 figs., 15 refs., 6 equations. **DWB, DLC, MH-BH**—By measuring the scattering coefficients from an airplane in different kinds of clouds (Cumulus congestus, cumulus, stratocumulus, stratus and altostratus) and using Koschmieder's

ormula which was checked by means of data obtained on Mount Washington, the visibility, rop size and liquid water content of these clouds were determined. Values ranged from 10 neters to several hundred meters for visibility, from 10μ to 4μ for drop size, and from 2.5 g/m³ or water content in the above named clouds in the respective order given. Microphotographs f droplet samples were made and one reproduced. *Subject Headings:* **Visibility, Drop-size istribution, Water content of clouds.**—*M.R.*

5–72 551.576

Keil, Karl, **Die Wolken.** [Clouds.] *Meteorologische Rundschau*, 1(9-10):299–302, March–April **1948.** 3 figs. **DLC**—*Subject Heading:* **Clouds.**

PRECIPITATION AND HYDROMETEOROLOGY

5–73 551.577.1

Rossmann, F., **Zum Niederschlagsverlauf bei Schauern und Gewittern.** [On the course f precipitation in showers and thunderstorms.] *Wetter und Klima*, 2(5–6):175–176, May–une **1949.** **DWB**—Type of precipitation, temperature, humidity, etc., noted during a squall hower. *Subject Headings:* **Rain squalls, Thunderstorms.**

5–74 551.577.2

Bouët, Max, **Méthode de comparaison des régimes pluviaux en météorologie synoptique.** Method of comparing rainfall regimes in synoptic meteorology.] *Archiv für Meteorologie, eophysik und Bioklimatologie, Ser. A*, 1(1):100–107, **1948.** 5 equations. Summary in French, erman and English p. 100–101. **MH-BH**—Author uses index S based on difference between bserved frequency of days with rain at both of two stations and theoretical frequency in nance series; S is between $+1$ and -1. Between 4 and 2,470 km. from Zürich, $S=e^{-0.0025d}$, in km. Up to 300 km. $S=-.0017d+0.94$. Two sides of Alps give S negative. *Subject Headings:* **Precipitation frequencies, Correlations.**—*C.E.P.B.*

5–75 551.577.3

Mämecke, Karlheinz, **Die 121jährige Niederschlagsreihe von Jena (1827–1947).** [The 21-year rainfall record at Jena (1827–1947).] *Zeitschrift für Meteorologie*, 3(3):84–87, March **1949.** 6 tables. **DWB**—The series is homogeneous and representative of Thuringia. Table 1 ives annual totals; mean variability 11½%. A rough analysis showed periodicities of 6 and 0.8 years (very wet years at sunspot maximum, very dry years at or 1–2 years before spot inimum). There are indications of longer periods. *Subject Headings:* **Precipitation varia-ons, Periodicities, Jena, Thuringia, Germany.**—*C.E.P.B.*

5–76 551.577.38:523.74

Fischer, Ernst, **Zur Frage der Trockenjahre.** [On the question of drought years.] *Vetter und Leben*, 2(1–2):23–26, [April]–May **1949.** table. **MH-BH**—Milan 1764–1947 and Klagenfurt 1813–1947 show tendency for maximum rainfall two years before sunspot maximum, nd minimum rainfall one year before and two years after spot minimum. Doubtfully signifi-ant. *Subject Headings:* **Droughts, Sunspots, Milan, Italy, Klagenfurt, Germany.**—*C.E.P.B.*

5–77 551.577.38

*John, Franz Joseph, **Die Trockenperiode im Frühjahr 1946.** [The drought in the spring f 1946.] *Geographische Gesellschaft, Wien, Mitteilungen*, 89(1–6):8–11, **1946.** 3 figs., 2 ables. **DLC**—An analysis of the rainfall and relative humidity by decades and the vapor ressure and number of rainy days in Austria for February, March, April and May 1946, and comparison with normal values. Monthly data for 37 stations listed in a table and percentage f normal rainfall shown on charts for March, April and May. *Subject Headings:* **Droughts, ustria.**—*M.R.*

5–78 551.577.38

Paulsen, Wolfgang, **Die Dürre auf der cimbrischen Halbinsel 1948.** [The drought in the imbrian peninsula 1948.] *Annalen der Meteorologie*, 2(3–4):112–115, March–April **1949.**

2 figs., 2 tables, 2 refs. Summary in German and English p. 112. **DWB** —Drought condition appeared in May–July 1948 in Schleswig and Jutland but not Holstein or northwest Germany and are shown in milk yield. Rainfall was deficient from February to July. In spring this wa due to anticyclonic conditions and in summer to steering of disturbances south of Schleswi by an upper air trough. *Subject Headings:* **Precipitation, Droughts, Schleswig-Holstein Germany, Jutland, Denmark.**—*C.E.P.B.*

5–79 551.577.62:551.579.

Geiger, Rudolph, **Die Auswirkungen der Dürre; (Dürrezahlen und Dürrewirkungs zahlen).** [The effect of drought; calculation of drought and its effects.] *Meteorologisch Rundschau*, 1(17–18):513–516, Nov.–Dec. **1948.** 3 figs., 4 tables, 16 refs. **DWB** *Subjec Headings:* **Droughts, Soil moisture.**

5–80 551.578.32:551.515.

Starbuck, L., **Typhoons and Hong Kong rainfall.** *Weather*, 5(4):158–159, April **1950** 2 figs. **DWB, MH-BH**—Five-day means of rainfall 1884–1938 show a double maximum separated by a minimum July 5–14. The first maximum is ordinary annual variation, secon maximum is due to typhoon rainfall. Second half of rainfall curve agrees with curve o typhoon frequency. *Subject Headings:* **Rainfall variations, Typhoons, Hong Kong.**

5–81 551.578.4

Wundt, Walter, **Über das Schwinden von Schneeflächen.** [On the disappearance o snow surfaces.] *Wetter und Klima*, 2(5–6):161–167, May–June **1949.** table. **DWB**—Fro observations on St. Moritz Lake in Jan. 1943, author concludes that at temperatures belo 0°C. snow surfaces lose ca. ½ mm. day by evaporation; above 0°C., by melting. Saturatio deficit is less important. *Subject Headings:* **Snow cover, Evaporation of snow, Switzerland.** *C.E.P.B.*

5–82 551.579:551.573:551.4

Jacobs, Woodrow C., **The distribution and some effects of the seasonal quantities of E-P (evaporation minus precipitation) over the North Atlantic and North Pacific.** *Archiv fü Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 2(1):1–16, **1950.** 6 figs., 2 tables, 10 refs. equation. Summary in English, German and French p. 1–3. **DWB, MH-BH**—Charts o the sum total of seasonal evaporation minus precipitation, for the Northern Hemisphere oceans compiled on the basis of previously computed seasonal evaporation and precipitation, ar presented. The computations show that: (1) in spite of greater area, the North Pacific ac tually contributes less moisture for precipitation over land than does the North Atlantic and (2) in summer, the Northern Hemisphere oceans are not sources of moisture for pre cipitation over land, leading to the assumptions that in summer: (1) moisture is carried into the Northern Hemisphere from the Southern, and (2) considerable moisture precipitated over the land and oceans must come from the continents. Quantitative data are given for differen areas and seasons both in terms of totals of E, P and E-P, and in terms of cm of excess o deficiency at a point or over an area. Values are computed for 10° squares. Salinity balance computed from the E–P values for North Atlantic and North Pacific, are shown graphi cally. It is assumed that the Arctic Ocean balances the Mediterranean, and the Indian Ocean the Red Sea, in respect to E-P over the Northern Hemisphere. *Subject Headings* **Hydrologic cycle, Evaporation, Precipitation, Salinity, Oceanography, Northern Hemisphere North Atlantic Ocean, North Pacific Ocean.**—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

5–83 551.58:620.19

Great Britain. Ministry of Supply and Department of Scientific and Industrial Research. **Tropic proofing.** London, H. M. Stationery Office, **1949.** 31 p. **DBS**—Describes tests and methods of proofing leather, textiles, paper, optical instruments, etc., against fungi and molds at high temperatures and humidities. Analyzes causes of damage to rubber and paints by intense insolation. *Subject Headings:* **Climatology, Corrosion.**

5–84 551.582(47)

†Vize, Vladimir IU., **Klimat moreĭ Sovetskoĭ Arktiki.** [Climate of the seas of the Soviet Arctic.] Leningrad, Izdat. Glavsevmorputi, **1940.** 123 p., 21 figs., 47 tables, numerous refs. **DLC**—An analytical as well as descriptive treatment of the climatic conditions in various parts of the Arctic Ocean and adjacent land area in the Soviet sector. The discussion is divided into five parts: (1) Summer, (2) Autumn, (3) Winter, (4) Spring and (5) the Warming up of the Arctic. Reference is made in each part to numerous classical and some not so well-known works on the meteorology of the Arctic. Most of the tables and figures are based on studies made during the 1930's such as: *Climate of Dixon Island* (1936), of *Vaigach and Iugorskii-Shar*, (1937), of *Novaya Zemlya and Franz Joseph Land* (1937), of *Novosibirsk Islands and the Lena Delta* (1937), and *Wrangel Island and the Chukotski Coast* (1937). Also material is taken from the scientific results of the "Sedov" and "Papanin" expeditions of 1937–1938, and the Fram and Maud expeditions earlier in the century. *Subject Headings:* **Climatology, Climatic variations, Arctic Seas, U.S.S.R.**—*M.R.*

5–85 551.582:551.524(492)

*Labrijn, A., **Het klimaat van Nederland; temperatuur/neerslag en wind.** [The climate of the Netherlands; temperature, precipitation and wind.] Koninlijk Nederlands Meteorologisch Instituut, No. 102 Mededelingen en Verhandelingen, Ser. A, 53, 's Gravenhage, **1948.** 71 p., fig., 26 tables. **DWB, DPL**—Average monthly and annual temperature (mean, mean maximum and minimum, extreme maximum and minimum), extreme daily temperatures, average monthly rainfall, frequency of wind directions for each year since records began, at one or more of a score of stations in Netherlands with from 60 to 110 years of record. In addition, there are a number of pages devoted to analytical data (frequency of temperature extremes and in certain class intervals), and tables showing adjustments used to produce or test homogeneity in records. Exposures, instruments and records at each station are discussed briefly. *Subject Headings:* **Climatology, Temperature, Netherlands.**—*M.R.*

5–86 551.582(81)

†§França, Ary, **Estudo sôbre o clima da bacia de São Paulo.** [Study on the climate of the São Paulo Basin.] São Paulo, **1946.** 59 p., 20 figs., 61 refs., append. **DLC**—A treatise in Portuguese on the various climatic factors of this isolated basin in southern Brazil, written in 1945 for a Doctor's thesis. Following the usual geographer's outline for a regional climatic study, the author presents a large number of graphs and charts of topography and the monthly means of the meteorological elements (pressure, temperature, humidity, rainfall, cloudiness, etc.) In addition, there is an analysis of wind direction frequencies by months, a discussion of air masses, general and local circulation by seasons, and an appendix containing a series of synoptic (isobaric) charts illustrating a typical rainy spell, with a general discussion of conditions prevailing at that time. *Subject Headings:* **Climatology, São Paulo Basin, Brazil.**—*M.R.*

5–87 551.582.1:634(56)

Tschermak, Leo, **Klima und Wald in Anatolien.** [Climate and forest in Anatolia.] *Wetter und Leben*, 2(1–2):4–13, [April]–May **1949.** **MH-BH**—Distinguishes three regions: steppes unforested since classical times; open "dry forest" of summer drought regions in west and south; rain forest in north and northeast (Pontus Mountains) with good rain at all seasons. Distribution of various trees analyzed. *Subject Headings:* **Climatology, Forests, Anatolia, Turkey.**—*C.E.P.B.*

5–88 551.583.2:551.513(261)

§Brooks, C. E. P., **Climatic fluctuations and the circulation of the atmosphere.** *Weather*, 5(3):113–119, March **1950.** 2 figs., 2 photos, 4 refs. **DWB, MH-BH**—Changes of climate in North Atlantic region since 7th century are related to changes in atmospheric circulation, glaciers advancing during periods of weak circulation and retreating during strong circulation. These are two stable persistent types maintained by ice conditions in Arctic Ocean; intermediate stages are transitory. The suggestion is made that the cause of these climatic perturbations is purely terrestrial. *Subject Headings:* **Historical climate, Climatic variations, Atmospheric circulation, North Atlantic, Arctic.**

5–89 551.583.

Argerich, Raúl F., **Paleoclima, estrellas variables e historia del sol.** [Paleoclimate variable stars and history of the sun.] *Boletin de Estudios Geográficos*, [Mendoza], 1(1):15-17, 4th quarter **1948.** **DLC**—A brief, general discussion of possible effects of variability in the sun's energy on climates through geological epochs. *Subject Headings:* **Paleoclimates, Solar influences.**

5–90 551.584:551.58

Fitch, James Marston, **Changing our city climates.** *Science Digest*, 24(1):45–47, July **1948.** **DLC**—Condensed from the book "American Building." Effect of artificial obstructions on wind speed, which in turn greatly affects comfort and microclimate in cities. Effect of trees. *Subject Headings:* **Microclimatology, Artificial influences, City planning.**—*M.R.*

5–91 551.584.43:6

†Sreenivasan, P. S. and Ramabhadran, V. K., **A statistical study of micro-climates.** *Indian Journal of Meteorology and Geophysics*, 1(1):35-44, Jan. **1950.** 13 tables, 11 refs. **DWB**—Detailed tables are presented, showing the conditions of temperature and vapor pressure at different heights in the "open" and inside growing crops (cotton, sugar cane, etc.). Correlation coefficients and variance are given for height, cover and meteorological elements concerned. Studies were made at the Central Agricultural Meteorology Observatory at Poona since 1932 and the results have been published in a number of papers by L. A. Ramdas. *Subject Headings:* **Agricultural meteorology, Microclimatology, Statistical studies.**—*M.R.*

BIOCLIMATOLOGY

5–92 551.586(02

Berg, Hellmut, **Einführung in die Bioklimatologie.** [Introduction to bioclimatology.] Bonn, H. Bouvier, **1947.** 131 p., 39 figs., tables, 15 refs., equations. **DLC**—This book comprises a brief but pertinent text on bioclimatology as a field of applied meteorology. Beginning with a discussion of radiation as a bioclimatic element, supported by numerous tables of data on solar and terrestrial radiation in various places, the author then treats of microclimatology, agricultural meteorology, phenology, city climates, climate of dwellings, factories or green houses; formulas for integration of physical factors (meteorological elements) as affecting animals or man; and finally weather in relation to health or disease. Nomograms and tables are given for calculating effective temperatures, and other complicated relations. Only the most significant aspects of medical meteorology are mentioned. *Subject Headings:* **Bioclimatology, Textbooks.**—*M.R.*

5–93 551.586:63

Ede, A. J. and Hales, K. C., **The physics of drying in heated air with particular reference to fruit and vegetables.** Dept. of Scientific and Industrial Research, Food Investigation Special Report No. 53. London, H. M. Stationery Office, **1948.** 50 p., 34 figs., 4 tables, 12 refs. **DWB**—Temperature and humidity conditions necessary for drying of apples, pears, plums, potatoes, cabbages and carrots. *Subject Headings:* **Industrial meteorology, Dehydration.**—*M.R.*

5–94 551.586:63

*Nuttonson, M. Y., **North American agro-climatic analogues of prewar Czechloslovakia, Poland and certain areas of East Prussia, Pomerania, Posen, West Prussia, Brandenburg and Silesia.** U. S. Dept. of Agriculture Foreign Agricultural Report No. 18, Feb. **1947.** 10+ p., map. **DA**—Description of climate of above areas. Tables of temperature, frost and precipitation (mean values) related to areas in the U. S. with apparently similar conditions in summer and winter. *Subject Headings:* **Bioclimatology, Agricultural meteorology, Czechloslovakia, Poland, Germany.**—*M.R.*

5–95 551.586:63

Haude, Waldemar, **Über Wetter und Witterung in ihrem Einfluss auf den Gewichtsertrag von Feldkulturen.** [On local and general weather in their influence on the harvest yields of

rops.] *Annalen der Meteorologie*, 2(5–6):165–182, May–June 1949. 6 figs., 6 tables, 7 refs. **MH-BH**—Discusses effects of cloudiness, temperature, saturation deficit, precipitation and wind on yields of oats and beets in different parts of Germany on different soils. The different factors are mutually related, but author constructs diagrams showing relation to temperature abnormality and rainfall amount in various months, and characteristics of good years are set out. Heavy and light soils are distinguished. Beets react oppositely to oats owing to different reaction to drought. Difficult to follow. *Subject Headings:* **Bioclimatology, Agricultural meteorology.**—*C.E.P.B.*

5–96 551.586:551.521.63:636

Kaiser, M., **Über den Einfluss künstlicher und natürlicher UV-Strahlen im Tierversuch.** On the influence of artificial and natural UV-radiation in research on animals.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 1(1):93–101, **1948.** 4 refs. Summary in German, English and French p. 93–94. **MH-BH**—To find whether ultraviolet radiation is harmful in smallpox cases, vaccinated rabbits were exposed to a quartz lamp and also to natural radiation at a height of 2,022 m. In both cases the development of the rash was clearly retarded compared with the control. Hence exposure to radiation is helpful rather than harmful. *Subject Headings:* **Bioclimatology, Ultraviolet radiation, Animals.**—*C.E.P.B.*

5–97 551.584:551.586:63

Kreutz, Wilhelm, **Beitrag zum Mietenklima.** [Contribution on the climate of root cellars.] *Meteorologische Rundschau*, 1(11–12):348–351, May–June **1948.** fig., tables. **DWB**—*Subject Headings:* **Agricultural meteorology, Microclimatology, Bioclimatology.**

5–98 551.586:551.521.63

Schulze, Rudolf, **Über die Bewertung der mittelwelligen Ultraviolettstrahlung in der Bioklimatologie.** [On the value of the middle wave length UV-radiation in bioclimatology.] *Wetter und Klima*, 2(5–6):144–150, May–June **1949.** 2 figs., 2 tables. **DWB**—Author summarizes briefly suspected effects of different wave lengths and considers that too much attention is given to ultraviolet radiation and too little to high-frequency radiation from fronts, long-wave ultraviolet and visible radiation. Experiments on increase of threshold value of ultraviolet for erythema with gradual exposure to ultraviolet are described. *Subject Headings:* **Bioclimatology, Ultraviolet radiation.**—*C.E.P.B.*

5–99 551.586:612

Hennig, R., **Die Klima-Temperamente der Menschen und Völker.** [The climatic temperament of men and peoples.] *Wetter und Klima*, 2(1–2):37–43, Jan.–Feb. **1949. DWB**—Distinguishes four climatic human types, both individual and racial, according to type of weather preferred: northern (cool), southern (hot, rather dry), western (maritime, rainy), eastern (extreme, dry). The first two are the commonest. Illustrated from poetry. *Subject Headings:* **Bioclimatology, Physiology.**—*C.E.P.B.*

5–100 551.587(749)

Brasefield, C. J., **Winds and temperatures in the lower stratosphere.** *Journal of Meteorology*, 7(1):66–69, Feb. **1950.** 6 figs., 9 refs. **DWB, DLC, MH-BH**—Results of 20 radiosonde flights to above 100,000 ft. over New Jersey during the years 1948–1949 are given and analyzed. Winds were strongest (westerly) at ca/40,000 ft., but in summer there was evidence of an easterly flow between 60,000 and 120,000 feet, and also of a stratospheric jet stream. No unusually high temperatures were found in the stratosphere (−30°C. at 120,000 feet being the highest). Equipment, balloons and radiosonde elements are described. *Subject Headings:* **Radiosondes, Upper air temperatures, Upper air winds, Stratosphere, New Jersey.**—*M.R.*

5–101 551.587(265)

†*Loewe, F. and Radok, U., **A meridional aerological cross section in the Southwest Pacific.** *Journal of Meteorology*, 7(1):58–65, Feb. **1950.** 5 figs., 7 tables, 32 refs. **DWB, DLC, MH-BH**—A comprehensive analysis of recent upper air temperature, pressure and wind data for the entire Southern Hemisphere, with frequent comparisons between Southern and Northern

Hemisphere conditions. The troposphere in temperate and high latitudes of the Southern Hemisphere is colder than in the Northern, due to the greater cloudiness and higher albedo in the south. Analysis of tropopause height data shows a break between 30° and 40°S. similar to that in the Northern Hemisphere. The jet stream lies nearer the equator in winter than would be expected. Also, the highest temperatures at the tropopause occur in temperate latitudes in winter, and at the poles in summer; and at that level it is warmer in winter than in summer in the tropics and temperate regions of the Southern Hemisphere. *Subject Headings:* **Upper air temperatures, Upper air pressure, Upper air winds, Tropopause, Southern Hemisphere.** —*M.R.*

5–102 551.588.9:92(03)

†Voeĭkov, Aleksandr Ivanovich, **Vozdeĭstvie cheloveka na prirodu.** [Influence of man on nature.] Moscow, Gosudarstvennoe Izdatel'stvo Geograficheskoi Literatury, **1949.** 254 p., 90 refs. **DLC**—A collection of the outstanding works of Voeikov (Woeikoff) on various phases of human activity in modifying nature. An introduction (37 pages) by V. V. Pokshishevskĭ gives a biography of Voeikov and a review of his work in human geography and meteorology. Then there are several articles on climatic amelioration and the effect of climate on industry and economy. Then follow some on the relation of water, sand (dust), forests, tundra, rivers, etc., to man. Particular regions, such as the Trans-Caspian, the Black Sea, the Arctic, the subtropics, the Volga River and Caspian Sea and changes in their levels are discussed in separate papers. The last paper is on cotton and climate. This is followed by a five page bibliography of works of the author, some of which are in German or French. *Subject Headings:* **Artificial influences, Biography, Collected works, U.S.S.R.**—*M.R.*

MISCELLANEOUS APPLICATIONS

SUNSPOTS

5–103 551.590.2:551.58

Keil, Karl, **Wie entsteht das Wetter?** [What causes the weather?] *Meteorologische Rundschau,* 1(11–12):362–365, May–June **1948. DWB, DLC**—A general discussion of the effect on the weather of the sun, planets, the moon, various types of radiation, variations in solar constant, water vapor in the atmosphere, the albedo of various types of surfaces, general and secondary circulation, etc. The conclusion is that the sun is the chief "cause" of weather. *Subject Headings:* **Weather controls, Cosmic influences.**—*M.R.*

5–104 523.74:551.590.2

*Coutrez, Gaston, **Le maximum d'activité solaire.** [The maximum of solar activity.] *Ciel et Terre,* 64(1–2):30–40, Jan.–Feb. **1948.** figs., tables. In French. **DWB**—Table and graph show sunspot numbers for 1947 to be maximum since 1778. Forecasts made in 1943 verified as to time but much too low in number. Forecast of next minimum will be March 1955. Several pages of data and description of sunspots July–Oct. 1947 from observations made at the Royal Observatory of Belgium. *Subject Headings:* **Sunspots, Long-range forecasting.**—*M.R.*

5–105 551.590.21:551.510.5:551.521.1

†*Eigenson, Moris Semenovich, et al., **Solnechnaia aktivnost' i eë zemnye proiavleniia.** [Solar activity and its terrestrial manifestations.] Moscow, OGIZ, **1948.** 323 p., 111 figs., 45 tables, 411 refs. **DLC**—Discusses solar activity: nature, cyclical changes, sunspots, ultraviolet rays reaching earth, solar corpuscles, ionospheric processes, effect of ultraviolet rays and corpuscles on ionosphere and geomagnetism, reflection on tropospheric phenomena: ozone, radiation, heat, colloidal processes, air masses, seasonal changes, auroras. *Subject Headings:* **Solar influences, Atmospheric structure.**—*M.R.*

5–106 551.590.21:523.74:92(04)

Hutchings, Edward, Jr., **Storms, sunspots and Dr. Stetson; this year, sunspot activity is at its highest and Dr. Harlan T. Stetson is busy finding out why.** *Science Illustrated,* 3(4):57–59, April **1948.** 5 figs. **DWB**—A popular article describing life and activities of Dr. Stetson

in his capacity as director of the Laboratory of Cosmic Terrestrial Research in Needham, Massachusetts. This year has broken all records for almost 200 years in regard to sunspot phenomena, which Stetson has been studying since 1926. Effect of seasons and daylight on conductivity of tree bark studied. *Subject Headings:* **Sunspots, Biography, Harlan T. Stetson.** —*M.R.*

5–107 551.590.21

Schove, D. Justin, **The sunspot-cycle before 1750.** *Terrestrial Magnetism and Atmospheric Electricity*, 52(2):233–238, June **1947.** 2 figs., 2 tables, ref. **DLC**—*Subject Headings:* **Solar influences, Sunspots.**

5–108 551.590.21:523.74

Thraen, August, **Die Züricher Sonnenflecken-Relativzahlen im Rahmen der 89jährigen Säkularperiode.** [The Zürich sunspot relative numbers in the light of the 89-year secular period.] *Meteorologische Rundschau*, 2(1–2):29–31, Jan.–Feb. **1949.** fig., 2 tables, ref. **DWB**—The author finds that besides the 11-year period there is a real 89-year period in the height of the maxima. *Subject Headings:* **Sunspots, Periodicities.** —*C.E.P.B.*

ATMOSPHERIC ELECTRICITY

5–109 551.594

Israël, Hans, **Zum Ionisationsgleichgewicht in atmosphärischer Luft.** [On the ionization balance in the free atmosphere.] *Meteorologische Rundschau*, 1(11–12):344, May–June **1948.** 7 refs., 5 equations. **DWB**—*Subject Headings:* **Ionization, Atmospheric electricity.**

5–110 551.594

Wall, Ernst, **Die elektrischen Vorgänge in der Atmosphäre als geschlossene Erscheinung.** [The electrical processes in the atmosphere as a continuous occurrence.] *Meteorologische Rundschau*, 1(7–8):195–200, Jan.–Feb. **1948.** 6 refs., equations. **DLC**—*Subject Heading:* **Atmospheric electricity.**

5–111 551.594.11

Israël, Hans, **Die halbtägige Welle des luftelektrischen Potentialgefälles.** [The half-daily wave in the potential gradient of atmospheric electricity.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 1(2):247–251, **1948.** 2 figs., 10 refs., 7 equations. Summary in German, English and French p. 247–248. **MH-BH**—Diurnal variation at continental stations interpreted as a diurnal wave with afternoon maximum combined with depression during day due to turbulent exchange. Fits observations at Davos. *Subject Headings:* **Potential gradient, Atmospheric electricity.**—*C.E.P.B.*

5–112 551.594.11

Paramonov, N. A., **Ob unitarnoĭ variatsii gradienta atmosferno-elektricheskogo potentsiala.** [The unitary variation of the gradient of atmospheric electric potential.] *Akademiia Nauk, SSSR, Doklady*, 70(1):37–38, **1950.** fig., 8 refs. **DLC**—Unitary variation means variation according to universal as distinct from local time. The existence of a variation according to universal time in the diurnal variation of the potential gradient was shown by Mauchly for the oceans and polar regions in 1923. This note gives a direct proof of the existence of such a variation of non-polar continental stations. The author took the original observations from 60 non-polar continental stations and calculated mean values after arranging them in groups according to longitude. Curves are given for the unitary variation, (i) over continental non-polar stations, (ii) over the polar regions and (iii) over the oceans. All three curves show a close correspondence. *Subject Headings:* **Atmospheric electricity, Potential gradient, U.S.S.R.**—*M.R.*

5–113 551.594.221:550

Norinder, Harald and Salka, Oskars, **The effect of geologic inequalities on the path of lightning, as indicated by model experiments.** *Tellus*, 1(4):1–5, Nov. **1949.** 5 figs., 6 refs. **DWB**—Results of 100 artificially induced lightning strokes under varying conditions in the

laboratory are given. Conclusions reached are: It is impossible to predict where lightning will strike on a surface that is a uniformly good conductor. When the surface in non-homogeneous, polarity has a decided effect—the negative strokes being distributed at random over the surface; whereas the rare positive strokes are concentrated on regions where good conducting surface is exposed. Even when the cloud is displaced at an angle of 45° to 55° from the vertical, the strokes are selective. Thus protection is apt to be more effective in the case of positive strokes over veins of high conductivity than in the case of negative strokes (90% of all cases in nature) or positive strokes over homogeneous surfaces. *Subject Headings:* **Lightning, Topographic effects, Lightning protection.**—*M.R.*

5–114 551.594.221:629.13

Rossmann, F., **Blitzwirkung auf ein Flugzeug.** [Effect of lightning on aircraft.] *Wetter und Klima*, 2(5–6):173–175, May–June **1949.** **DWB**—*Subject Headings:* **Lightning, Aeronautical meteorology.**

5–115 551.594.25:551.574.42:551.578.4

†*Kramer, C., **Electrische ladingen aan berijpte oppervlakken.** [Electric charges on rime-covered surfaces.] Koninlijk Nederlands Meteorologisch Instituut, No. 102, Mededelingen en Verhandelingen, Ser. A, 54, 's Gravenhage, **1948.** 128 p., 17 figs., 11 tables, 75 refs., numerous equations. Summary in Dutch, English and German p. 120–126. **DWB**—A substantial contribution to precise knowledge of the subject, inspired by the work of Lange (*Met. Zeit.*, 1940, p. 429) and Findeisen (*ibid.*, p. 201), with reference to the potential on growing rime formations and electrical phenomena attending the formation, growth and evaporation of ice crystals. Lange's results were confirmed but Findeisen's conclusion that positive charges are formed on rime was found to be erroneous—in fact a negative charge was observed. The rate of charge was found to be proportional to the velocity of the attending air currents and if a sudden increase in speed occurs, a sudden jump in charge occurs likewise. Elaborate equipment was developed and is illustrated in detail along with resulting data. *Subject Headings:* **Electricity of precipitation, Icing, Rime formation.**—*M.R.*

5–116 523.74:550.385:551.510.535:551.594.5

Fanselau, Gerhard, **Über die Störung der Ionosphäre vom 24–26 Januar 1949.** [On the disturbance of the ionosphere from January 24–26, 1949.] *Zeitschrift für Meteorologie*, 3(4):100–110, April **1949.** 6 figs., 5 tables. **DWB**—On Jan. 21st two large spots approached central meridian of sun. A magnetic storm began on Jan. 24th and is described in detail. Reception of the 1,250 m. space radio wave from Kalundborg showed great variations. Twenty-seven-day recurrences are clearly shown in Potsdam magnetic character figures from December to March. Associated auroras on Jan. 24–26 are listed and described. *Subject Headings:* **Sunspots, Magnetic storms, Auroras, Ionosphere, Potsdam, Germany.**—*C.E.P.B.*

5–117 551.594.5:550.38

Fanselau, Gerhard, **Die erdmagnetische Aktivität im Jahre 1947 nach den Beobachtungen in Niemegk.** [Terrestrial magnetic activity in the year 1947 from observations at Niemegk.] *Zeitschrift für Meteorologie*, 3(1–2):19–25, Jan.–Feb. **1949.** graph, 14 tables, ref. **DLC**—Daily and 3-hourly character figures and summary of auroral observations given. Figure shows 3-hourly values in 27-day sections. *Subject Headings:* **Auroras, Terrestrial magnetism.**—*C.E.P.B.*

5–118 551.594.5

Gartlein, C. W., **Aurora spectra showing broad hydrogen lines.** *American Geophysical Union, Transactions*, 31(1):18–20, Feb. **1950.** 2 figs. **DWB**—Spectra of all outstanding auroral displays since 1939 have been recorded by National Geographic-Cornell University project at Ithaca, New York. There is evidence that protons from sun penetrate atmosphere during ionospheric disturbances producing hydrogen lines, especially just before great auroral activity. Intensity of spectrum lines plotted versus wave length from 4,000A. to 5,800A. Also plot of intensity of hydrogen lines versus width and line of sight velocity shown. *Subject Headings:* **Auroral spectra, Ionospheric composition.**—*M.R.*

5–119 551.594.5:77

Götz, F. W. Paul, **Eine Anregung zur Nordlichtphotographie.** [A hint on auroral photography.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 1(1):141, **1948.** Summary in German and English p. 141. **MH-BH**—Proposes a method of synchronizing photographs at distant stations. *Subject Heading:* **Auroral photography.**

5–120 551.594.5

Meinel, A. B., **Strong permitted O(I) and N(I) lines in the infrared auroral spectrum.** *American Geophysical Union, Transactions*, 31(1):21–24, Feb. **1950.** 3 figs., 10 refs. **MH-BH, DWB**—Results of observations on the infrared radiations in upper atmosphere, made at Lick Observatory. Equipment is described. Energy level diagrams for strong permitted lines of oxygen and nitrogen in aurora, and variation of excitation with energy level for seven permitted transitions are shown graphically. There is conclusive evidence that telluric bands in night sky spectra occur in *absorption*, not in *emission* as formerly held. *Subject Headings:* **Infrared radiation, Auroral spectra, Light of the night sky.**—*M.R.*

5–121 551.596.1(54)

*Mathur, L. S., **Reflection of sound waves from the stratosphere over India in different seasons of the year.** *Indian Journal of Meteorology and Geophysics*, 1(1):24–34, Jan. **1950.** 7 figs., 3 plates, 2 tables, 3 refs. **DWB**—Three series of observations were made in India during the summer, fall and winter of 1946–1947 to determine the trajectories of sound waves (from explosions) through the stratosphere. Two explosion centers and nine recording stations (in the form of a cross with the axis along the line joining the two centers) were set up by the Meteorological Department, and their locations shown on a chart. Actual recorder records of ground waves and reflected waves are reproduced, and derived data presented in tables and graphs. In the summer better reception was obtained toward the south, whereas, after the monsoon season, and in the winter better records were obtained to the north (up to 294 kms.) of the explosions. Records of the ground wave were obtained even in the "zone of silence." Trajectories are illustrated and temperatures and lapse rates in the stratosphere computed and plotted. *Subject Headings:* **Sound waves, Atmospheric acoustics, Stratosphere, India.**—*M.R.*

ICE

5–122 551.311.12

Tollner, Hans, **Ergebnisse der Gletscheruntersuchungen in den Hohen Tauern im Spätsommer 1949.** [Results of glacier investigations in the Hohe Tauern Mountains (Austria) in late summer 1949.] *Wetter und Leben*, 2(7–8):159–161, Dec. **1949. MH-BH**—*Subject Headings:* **Glaciers, Austria.**

5–123 551.311.17(269)

Minchin, C., **Weather and pack-ice encountered during the season 1948/49 in Antarctic waters.** *Marine Observer*, 20(147):50–51, Jan. **1950.** fig. **DWB**—*Subject Headings:* **Pack-ice, Antarctic Seas.**

5–124 551.311.173(98)

Karelin, D. B., **Izuchenie granits mnogoletnego l'da v poliarnom basseĭne.** [Study of the boundaries of enduring ice in the polar basin.] *Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia*, 79(4):481–482, July–Aug. **1947.** chart, table. **DWB**—During the period from 1940–1946, Soviet pilots made flights toward the pole from the continent, crossing the boundaries of the "permanent" ice-pack 24 times. From data obtained during this period, a chart has been drawn, showing the approximate limits of the boundaries of permanent ice during these years, and the paths of flight. Such a boundary is, naturally, rather indefinite and very changeable. *Subject Headings:* **Polar ice, Arctic.**—*M.R.*

5–125 551.311.181:06

Blüthgen, Joachim, **Der Eisdienst in Mecklenburg.** [The Ice Service in Mecklenburg.] *Zeitschrift für Meteorologie*, 1(8–9):242–253, May–June **1947.** 3 illus., 3 figs. **DWB**—*Subject Headings:* **Hydrographic institutions, Ice surveys, Germany.**

OCEANOGRAPHY

5–126 551.46:551.48(09)

Bates, Charles C. and Fleming, Richard H., **Oceanography in the Hydrographic Office.** *Military Engineer*, 39(262):338–344, Aug. **1947.** 4 figs., 3 photos. **DLC** —*Subject Headings:* **Oceanography, Hydrography, History.**

5–127 551.463(262)

Darmois, Mme. Robert, **Mesures viscosimétriques en Méditerranée et définition d'une nouvelle constante océanographique.** [Viscosity calculations in the Mediterranean and definition of a new oceanographic constant quantity.] *Académie des Sciences, Paris, Comptes Rendus*, 225(23):1167–1169, Dec. 10, **1947.** table. **DWB**—Viscosity calculations are shown, and observational and theoretical considerations described. *Subject Headings:* **Oceanography, Viscosity of sea water, Mediterranean.**—*M.R.*

5–128 551.465

Biske, S. F., **O novoĭ gipoteze morskikh techeniĭ v Bosfore.** [On a new hypothesis of ocean currents in the Bosporus.] *Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia*, 79(4):486–489, July-Aug. **1947.** 2 figs., 9 refs. **DWB**—Diagrams show in underwater relief, and cross section shows currents. *Subject Headings:* **Ocean currents, Hydrography, Bosporus.**

5–129 551.465

Platzman, George W., **The partition of energy in periodic irrotational waves on the surface of deep water.** *Journal of Marine Research*, 6(3):194–202, **1947.** 2 tables, 8 refs., 12 equations. **DWB**—General formulas given for the kinetic and potential energy of oscillatory waves when the depth is not limited. General theory is first reviewed, followed by results of new method for performing the successive approximations that lead to the coefficients in Stokes' solution. Applicable also, without alteration, when depth of water is limited, provided appropriate coefficients in the Fourier expansions are employed. No extension has been made since Stokes (1880) carried through the third order the successive approximations. *Subject Headings:* **Oceanography, Hydrodynamics.**—*M.R.*

5–130 551.465:551.464

Proudman, J., **On the mixing of sea water by turbulence.** *Royal Society of London, Proceedings, Ser. A*, 195(1042):300–309, Dec. 22, **1948.** 3 refs. **DWB**—Variations of salinity in time and space similar to variations of temperature ignoring radiation effects, molecular conductivity and molecular diffusion (which are negligible) are compared with effects of eddy diffusion and eddy conductivity. Equations of continuity given. When mean salinity is independent of depth, as in the central Irish Sea, the coefficient of eddy diffusion depends only on turbulence. Taylor's theory applied to determine mean current through this region. *Subject Headings:* **Oceanography, Hydrodynamics, Salinity.**—*M.R.*

5–131 551.465

Starr, Victor P., **Momentum and energy intervals for gravity waves of finite height.** *Journal of Marine Research*, 6(3):175–193, **1947.** 2 figs., 11 refs., 71 equations. **DWB**—Author considers the integral properties of gravity waves in a homogeneous and incompressible fluid, restricted to plane waves in an irrotational medium which move without change of form. Applicable to waves of finite height. Summary gives conclusions for periodic waves, indicating: (1) product of momentum and wave speed is equal to twice the kinetic energy; (2) for basin of infinite depth, sum of kinetic energy of horizontal motions, plus three times the kinetic energy of vertical motions is equal to twice the potential energy. Kinetic energy of horizontal is greater than that of vertical motions. For solitary wave: (3) the momentum is equal to the superficial mass times the wave speed, not only for the entire wave but for any portion bounded laterally by two verticals; (4) kinetic energy of horizontal motions is greater than that of vertical motions by an amount equal to the potential energy. Total kinetic energy is larger than the potential energy; (5) square of speed of propagation is equal to depth of basin acceleration of gravity+three times ratio of potential energy to superficial mass. *Subject Headings:* **Oceanography, Hydrodynamics.**—*M.R.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON TORNADOES

By: *Harris P. Kramer*

EXPLANATORY NOTE

This bibliography has been divided into two parts, each arranged chronologically with the earliest works first. Analytical or theoretical papers, or those having statistical or forecasting significance, appear in the first section with customary Universal Decimal Classification (UDC) numbers and with subject headings.

The second section consists of a more briefly annotated list of references usually to single occurrences of tornadoes in the United States. All entries, however, have been checked unless otherwise indicated, and are indexed by author, subject, and geographical area if significant.

This bibliography is not exhaustive; however, it does attempt to include as many of the important recent or theoretical papers as possible. Most reports from European sources are of "Tromben" or funnel-shaped whirlwinds which may or may not compare in violence with those of the Mississippi Valley. Only a few references to waterspouts are included. Anyone wishing to make a more exhaustive survey should consult the bibliographic items, E–132 through E–139.

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ANALYTICAL, THEORETICAL AND STATISTICAL STUDIES ON TORNADOES, WHIRLWINDS AND WATERSPOUTS

1841–1900

E–1 551.515.3

Espy, James, **The tornado or water-spout.** (In his **Philosophy of storms,** Boston, Little Brown, **1841.** p. 304–373, figs., charts, tables, refs.) **DLC**—Thorough descriptive account of early tornadoes. Theory that heat of vaporization supplied energy for strong convection. *Subject Headings:* **Tornadoes, Waterspouts.**

E–2 551.515.3(749)

Redfield, W. C., **Remarks relating to the tornado which visited New Brunswick, N. J., June 19, 1835 with a plan and schedule of the prostrations observed on a section of its track.** *Franklin Institute, Journal,* 32:40–49, **1841.** plate, 5 tables, refs. **DLC**—Discussion of the forces and characteristics of a tornado, emphasizing particularly the whirling action as observed in the New Brunswick tornado. *Subject Headings:* **Tornadoes, Tornado dynamics.**

E–3 551.515.3(75)

Whitfield, Hampton S., **Tornadoes in the southern states.** *American Journal of Science,* 102:96–108, Aug. **1871. DLC**—Extensive theoretical discussion of formation of tornadoes with critical reference to Espy, Redfield, and Loomis. Elaborates on direction of movement of tornado. Some mention of electricity, hail, and speculation on pressures within a tornado. *Subject Headings:* **Tornadoes, Tornado formation.**

E–4 551.515.3:551.590.21

Reye, [Carl] Theodor, **Die Wirbelstürme, Tornados und Wettersäulen in der Erd-Atmosphäre mit Berücksichtigung der Stürme in der Sonnen-Atmosphäre.** [Whirling storms, tornadoes, and funnel clouds in the earth's atmosphere with reference to sunspots.] Hannover, **1872.** 247 p., figs., tables, refs. **DLC**—Land and waterspouts and tornadoes discussed. Theoretical and de-

scriptive accounts, causes and formation, considered. A section describes tornadoes of North America, citing examples. Mechanical functions of whirlwinds. *Subject Headings:* **Tornadoes, Sunspots.**

E–5 551.515.3(77)

Mackintosh, James, **The Iowa and Illinois tornado of May 22, 1873.** *Quarterly Journal of Science*, 43:339–394, July **1874.** 31 figs. **DLC** –Thorough description and discussion. Calculations of size, force, wind directions, velocities, etc. of tornado. *Subject Headings:* **Tornadoes, Tornado dynamics.**

E–6 551.515.3(77)(78)

*§Finley, J. P., **Report of the tornadoes of May 29 and 30, 1879, in Kansas, Nebraska, Missouri, and Iowa.** U. S. Signal Service, War Dept., Professional Papers, No. 4, Washington, D. C., **1881.** 116 p., numerous maps, diagrs. **DWB**—Lengthy, detailed, graphic report of several individual storms and the general atmospheric conditions preceding and accompanying this series of storms. *Subject Heading:* **Tornadoes.**

E–7 551.515.3

*Finley, J. P., **Character of six hundred tornadoes.** U. S. Signal Service, War Dept., Professional Papers No. 7, Washington, D. C., **1882.** 19 p., maps, table. **DLC**—Table of 600 tornadoes gives data on time, direction, size, velocity, cloud form, direction of whirl, and associated temperatures, rain, hail, winds, and electricity. Deductions as to frequency by states and by months. Suggestions for investigations. Geographical distribution. *Subject Headings:* **Tornadoes, Tornado statistics.**

E–8 551.515.3:551.515.1

Davis, William M., **The relation of tornadoes to cyclones.** *American Meteorological Journal*, 1:121–127, **1884.** 2 figs. **DLC**—Relation found and exemplified between tornadoes and their "parent" cyclones. *Subject Headings:* **Tornadoes, Cyclones.**

E–9 551.515.3

Ferrel, William, **Recent advances in meteorology.** U. S. Signal Service, War Dept., Chief Signal Officer, Report 1885, Appendix 71, Washington, D. C., **1886.** p. 324–330. **DWB**—Where and when tornadoes are likely to occur. Two principle conditions necessary to occurrence of tornadoes are discussed: 1) state of unstable equilibrium of air and 2) gyratory motion with reference to any assumed center. *Subject Headings:* **Tornadoes, Tornado formation.**

E–10 551.515.3

*§Finley, J. P., **Tornado studies for 1884.** U. S. Signal Service, War Dept., Professional Papers No. 16, Washington, D. C., **1885.** 74 charts. **DWB**—Contains statistical data on distribution of tornadoes by months, their relative frequencies by days, their direction of movement, descriptions of the cloud forms, and temperature before and after the tornado, as well as synoptic charts showing isobars and winds. *Subject Headings:* **Tornadoes, Tornado statistics.**

E–11 551.515.3

Wiseman, Theo, **Origin and laws governing tornadoes, cyclones, thunderstorms, and Kansas twisters: a full explanation of how, when, and where, these monsters of the air originate, from close observations made in Kansas for six years.** Lawrence, Kansas, **1885.** 15 p. **DWB**—*Subject Headings:* **Tornadoes, Tornado formation.**

E–12 551.515.3

Ferrel, William, **Tornadoes.** (In his **A popular treatise on the winds: comprising the general motions of the atmosphere, monsoons, cyclones, tornadoes, waterspouts, hail-storms, etc.** New York, John Wiley and Sons, **1889.** p. 347–448, figs., table.) **MH-BH**—Extended consideration is given to gyratory velocity and its effect on pressure as well as on energy of a tornado. Conditions for tornado formation, accompanying rainfall and hail, barometer reactions, as well as waterspouts, dust devils, etc. *Subject Headings:* **Tornadoes, Waterspouts, Tornado dynamics.**

E–13 551.515.3:551.515.1(7)

Brucker, Joseph, **Cyclones and tornadoes in North America.** *American Meteorological Journal*, 7:399–404, **1890.** 5 figs. **DLC**—Held that movements of atmosphere are analogous with those of liquids. Theory applied to tornado inception in brief explanation. Recognized that tornadoes occur where cold and warm fronts meet, in a calm atmosphere. *Subject Headings:* **Tornadoes, Tornado formation.**

E–14 551.515.3

Davis, William Morris and Curry, Charles Emerson, **Ferrel's convectional theory of tornadoes.** *American Meteorological Journal*, 6:337–349, 418–431, 448–463, **1889–1890.** 6 figs. **DLC**—Thorough discussion of subject. *Subject Heading:* **Tornado formation.**

E–15 551.515.3(73)(4)

Faye, M. H., **Trombes and tornadoes.** *American Meteorological Journal*, 6:541–556, **1890;** *idem*, 7:29–35, 82–87, 128–133, 147–155, 257–263, **1890.** 7 figs., refs. **DLC**—Series of articles dealing extensively with theory, explanation, descriptions and discussions of various occurrences of "trombes" and tornadoes in Europe and U. S. A. *Subject Headings:* **Tornadoes, Whirlwinds.**

E–16 551.515.3

Finley, J. P., **Tornadoes.** First prize essay. *American Meteorological Journal*, 7:165–179, **1890. DLC**—Discusses and gives summary of the general characteristics of tornado development and the relation of tornado regions to areas of low pressure. *Subject Headings:* **Tornadoes, Tornado formation.**

E–17 551.515.3

Hazen, H. A., **Tornadoes.** A prize essay. *American Meteorological Journal*, 7:205–229, **1890.** tables. **DLC**—Many aspects of tornado formation and characteristics discussed: electricity, air pressure, winds, path, etc. Theories discussed in relation to sunspots, thunderstorms, cyclones. Tornado causes, destruction. List of some of most violent tornadoes in U. S. *Subject Heading:* **Tornadoes.**

E–18 551.513.3(781)

Davis, William Morris, et al., **Lawrence tornado of July 26, 1890.** (3 papers.) **The features of tornadoes and their distinction from other storms** by W. M. Davis; **The Lawrence tornado** by H. H. Clayton; **Evidence of vorticular motion in the Lawrence tornado** by H. F. Mills. *Astronomical Observatory, Harvard College, Annals*, 31(part 1):119–156, **1892.** 5 plates. (reprint.) **DWB**—Thorough meteorological investigation. *Subject Headings:* **Tornadoes, Vorticity.**

E–19 551.515.3

McAdie, A., **Tornadoes.** Second prize essay. *American Meteorological Journal*, 7:179–192, **1890.** 2 figs., refs., equation. **DLC**—Nature and general characteristics of tornadoes and the possibility and practicability of predicting them discussed. *Subject Headings:* **Tornadoes, Tornado forecasting.**

E–20 551.515.3(497.1)

§Mohorovičić, A., **Der Tornado bei Novska.** [The tornado at Novska (Yugoslavia).] [A paper delivered before a meeting of the] Südslavischen Akademie der Wissenschaften und Künste, April 22, 1893. Agram, [Zagreb, Yugoslavia], **1894.** 23 p., 4 figs., tables, equation. **DLC**—Thorough treatment of the occurrence June 1892. Contains relief maps of Yugoslavia, weather chart, isobronts which coincided with tornado, extensive table, diagram showing damage. Descriptions of tornadoes and observations of witnesses. *Subject Headings:* **Tornadoes, Yugoslavia.**

E–21 551.515.3

Dines, W. H., **Experiment illustrating the formation of the tornado cloud.** *Royal Meteorological Society, Quarterly Journal*, 22:71–74, Jan. **1896.** 3 figs. Discussion. **DLC**—Apparatus described which forms a funnel cloud in the laboratory. Photographs show resemblances to natural tornado cloud. *Subject Heading:* **Tornado formation.**

E–22 551.515.3

Moore, Willis L., **The winds—tornadoes.** Missouri State Board of Agriculture, 29th Annual Report, **1896.** p. 166–182. (Excerpt available.) **DWB**—Statistical study. Conditions for formation briefly discussed, as well as tabulation of damage, wind velocities, frequency of tornadoes, etc. *Subject Headings:* **Tornadoes, Tornado statistics.**

E–23 551.515.3(778)

Baier, Julius, **Wind pressures in the St. Louis tornado.** *American Society of Civil Engineers, Proceedings*, 23:55–124, Jan. **1897.** 19 figs., 8 plates, tables, equations, 3 append. **DLC**—Detailed investigation and discussion. Definite estimates recorded of the force of the wind on several structures of known stability that collapsed in the tornado, plus other characteristic examples of destruction indicative of this force. *Subject Heading:* **Tornado dynamics.**

1901–1920

E–24 551.515:551.515.3

*Bigelow, Frank H., **Studies on the vortices in the atmosphere of the earth. I. The application f the theory of vortex motion to the funnel-shaped waterspout at Cottage City, Aug. 19, 1896. II. he theory of vortex motion applicable to the dumb-bell-shaped tube in the Cottage City waterspout. Monthly Weather Review*, 35:464–480, 1907. **III. The truncated dumb-bell vortex illustrated by the t. Louis, Mo., tornado of May 27, 1896. IV. The DeWitte typhoon, August 1–3, 1901. V. The nperfect truncated dumb-bell-shaped vortex and the composition of vortices illustrated by the ocean-cyclone of Oct. 11, 1905.** *Monthly Weather Review*, 36:245–250, 328–333, 398–404, **1908. I. The asymmetric land cyclone and its system of vortex lines. The concave dumb-bell-shaped ortex.** *Monthly Weather Review*, 37:48–53, 1909. 19 figs., 85 tables, refs., 68 equations. **DWB**—Highly theoretical work. *Subject Headings:* **Tornadoes, Waterspouts, Vorticity, Cyclones.**

E–25 551.515.3:551.509

Durand-Gréville, E., **Squalls and predictions of tornadoes.** *Monthly Weather Review*, 42:97–99, 914. fig., refs. **DWB**—Author says tornadoes *always* originate on front edge of the "squall-one." *Subject Headings:* **Tornadoes, Tornado forecasting.**

E–26 551.515.3(09)

†Hellman, G., **Die ältesten Untersuchungen über Windhosen.** [The oldest research of funnel louds.] (In his **Beiträge zur Geschichte der Meteorologie. II.** [Contributions to the history of neteorology.] Berlin, Behrend & Co., **1917.** p. 329–334, refs.) **DWB**—Comment on and refer-nces to ancient accounts of whirlwind occurrences in the Mediterranean regions, and a short history om records made in 17th and 18th centuries. *Subject Headings:* **Tornadoes, History, Europe.**

E–27 532:551.5

Rayleigh, Lord, **On dynamics of revolving fluids.** *Royal Society of London, Proceedings, Ser. A*, 3:148–154, **1917.** refs., 21 equations. **DLC**—As applicable to meteorology. *Subject Headings:* **orticity, Fluid mechanics.**

E–28 551.515.3(73)

Ward, R. DeCourcy, **The tornadoes of the United States as climatic phenomena.** *Royal Me-orological Society, Quarterly Journal*, 43:317–329, **1917.** 5 figs., 4 plates, 10 refs. **DLC**—General escription of United States type of tornado with accounts, pictures, diagrams of damage, tracks, tc. *Subject Headings:* **Tornadoes, United States.**

E–29 551.515.3(4)

†*Wegener, Alfred, **Wind- und Wasserhosen in Europa.** [Wind spouts and water spouts in urope.] Die Wissenschaft, Vol. 60, Braunschweig, **1917.** 301 p., 85 figs., tables, refs., 8 equations. **DLC**—Extensive, detailed, theoretical work. Eleven selected works on the subject are reviewed. ist of 258 useful references to occurrences of funnel clouds. Statistical consideration of distribution f funnel clouds, movements, duration, relation to depressions, relative humidity, etc. Accompany-ng weather conditions, including thunderstorms, winds, turbulence. Formation and dissolution of unnel clouds. Multiple funnel clouds. Study of tracks of storms. Rotation and wind speed, ack of air in center. Structure studied, as well as the "eye," noise, odor, and electrical phenomena. Damage. Opinions on the origin of funnel clouds, including electrical, thermodynamical, and echanical theories of formation. Mechanical theory stressed. *Subject Headings:* **Whirlwinds, Waterspouts, Tornado dynamics, Tornado formation, Europe.**

E–30 551.515.3:551.515.1

§Shaw, Napier, **The travel of circular depressions and tornadoes and the relation of pressure to ind for circular isobars.** Great Britain, Meteorological Office, *Geophysical Memoirs*, 2(12):23–44, 918. maps, refs., 11 equations. **DLC**—Discusses cyclones primarily, but considers the "distribu-on of pressure referred to the tornado centre." *Subject Headings:* **Tornadoes, Tornado dynamics, yclones.**

E–31 551.515.3

Wegener, Alfred, **Einige Hauptzüge aus der Natur der Tromben.** [Some major factors in the ature of whirlwinds.] *Meteorologische Zeitschrift*, 35:245–249, **1918.** 2 figs., ref. **DLC**—Theo-etical consideration of formation of and characteristics of path, duration, wind directions, damage, tc., of European-type tornadoes, with particular note of their association with thunderstorm onditions. Abstract (entitled): "Some characteristics of tornadoes." *Monthly Weather Review*, 7:728, **1919.** *Subject Headings:* **Whirlwinds, Thunderstorms.**

E–32 551.515.3(471)

Letzmann, Johannes, **Tromben in Ostbaltischen Gebiet.** [Whirlwinds in the eastern Baltic region.] Dorpat, **1920.** 46 p., 22 figs., 8 plates, tables, refs., 3 equations. **DLC**—Descriptive accounts and meteorological analyses. *Subject Headings:* **Whirlwinds, Baltic.**

E–33 551.515.3(77)(78)

Papers on tornadoes—the thirteen tornadoes of March 28, 1920. *Monthly Weather Review*, 48:191–203, **1920.** 9 figs., 2 tables. **DWB**—Mitchell, Charles L., **Tornadoes of March 28 in northeastern Illinois.** Extensive descriptive account.—Stewart, W. P., **In Wisconsin.** Brief account.—Holcomb, E. W., **In Indiana.—In Ohio.—In lower Michigan.**—Root, Clarence J., **In central Illinois.**—Meisinger, C. LeRoy, **Discussion of tornado conditions.** Weather situation analyzed.—Jakl, Vincent E., **A kite flight in the center of a deep area of low pressure.** Discussion by C. F. Brooks with speculation on the part of cold winds aloft, vertical motion, etc.—Smyth, P. H., **The tornadoes of March 28, 1920, in east-central Indiana.**—Giddings, R., **In Georgia.**—Brooks, Charles F., **Conclusion.** Synoptic conditions analyzed.

The four tornadoes of April 20, 1920. *Ibid.*, p. 203–210, 2 figs. **DWB**—Jaqua, J. H., **Tornadoes in eastern Mississippi, April 20, 1920.** Meteorological conditions, distribution and points of origin, and individual occurrences described.—Smyth, P. H., **The tornadoes of April 20, 1920, in Alabama.** Meteorological conditions given and lengthy descriptions of occurrences.—Nunn, Roscoe, **In Tennessee.** Brief account. *Subject Headings:* **Tornadoes, Tornado distribution.**

1921–1930

E–34 551.515.3

Exner, Felix M., **Über die Bildung von Windhosen und Zyklonen.** [On the formation of wind spouts and cyclones.] *K. Akademie der Wissenschaften, Vienna, Mathematische-Naturwissenschaftliche Klasse, Sitzungsberichie, IIa*, 132:1-16, **1923.** 6 figs., refs., equation. **DWB**—Dynamic and thermodynamic theories for tornado formation are discussed at length. *Subject Headings:* **Tornadoes, Tornado formation.**

E–35 551.515

Milch, W., **Über Bjerknes' Dynamik der Wirbel und Wellen mit Bemerkungen des Referenten über asymmetrische Zyclonen.** [On Bjerknes' dynamics of circular vortex and wave motions with remarks of the author on asymmetrical cyclones.] *Meteorologische Zeitschrift*, 40:104–108, **1923.** 6 figs., 8 equations. **DWB**—Discussion of Bjerknes' work (*Geofysiske Publikationer*, vol. 11, no. 4, **1921**) on the dynamics of the circular vortex with applications to the atmosphere and atmospheric vortex and wave motions. *Subject Headings:* **Vorticity, Cyclones.**

E–36 551.515.3

†Hartmann, Wilhelm, **Beiträge zur einer Theorie der Tromben.** [Contributions to a theory of whirlwinds.] *Meteorologische Zeitschrift*, 41:101–109, **1924.** 3 figs., 2 tables, refs., equations. **DWB, MH**—Thorough, theoretical discussion of dynamics of whirlwinds. *Subject Headings:* **Whirlwinds, Tornado dynamics.**

E–37 551.515.3(492)

Everdingen, E. van, **The cyclone-like whirlwinds of August 10, 1925.** *K. Akademie van Wetenschappen te Amsterdam, Proceedings of the Section of Sciences*, 28(10):871–889, **1925. DLC**—Abstract by B. M. Varney, **Aerological evidences as to the causes of tornadoes.** *Monthly Weather Review*, 54:163–165, April **1926.** fig., refs. **DLC**—Detailed analytical report of whirlwind condition that caused extensive damage in Holland, Aug. 10, 1925. Author holds that both thermodynamical and mechanical conditions account for inception of whirlwinds. *Subject Headings:* **Whirlwinds, Tornado formation, Holland.**

E–38 551.515.3

†*Letzmann, Johannes, **Fortschreitende Luftwirbel.** [Progressively moving whirlwinds.] *Meteorologische Zeitschrift*, 42:41–52, Jan. **1925.** 16 figs., refs., equations. **DWB**—Investigation and theoretical speculation on the circulation of air in whirling-type storms. Diagrams show cross sections of wind spouts. Tracks of whirling storms plotted. Detailed schematic diagrams show windfields for various types of whirlwinds. *Subject Headings:* **Whirlwinds, Tornado dynamics.**

E–39 551.515.3(761)

*Stevens, Welby R., **Tornadoes in Alabama.** *Monthly Weather Review*, 53:437–443, **1925.** 6 figs., 6 tables, 3 refs. **DWB**—Statistics on tornadoes in Alabama since 1794. Some analysis of synoptic conditions. *Subject Headings:* **Tornadoes, Tornado statistics, Alabama.**

E–40 551.515.3

Humphreys, W. J., **The tornado.** *Monthly Weather Review*, 54:501–503, **1926.** **DWB**—Twenty-six circumstances of place and meteorological conditions connected with the occurrences of tornadoes are listed and discussed. Physical explanation of origin of tornado given. *Subject Headings:* **Tornadoes, Tornado formation.**

E–41 551.515.3(73)

*Root, Clarence J., **Some outstanding tornadoes.** *Monthly Weather Review*, 54:58–60, **1926.** Valuable. **DWB**—Statistical paper giving table of most important tornadoes up to that time. Also typewritten manuscript, with same title, Springfield, **1926.** 50 p., refs. **DWB**—Lists of tornadoes. Descriptions of individual occurrences. Discussion. *Subject Headings:* **Tornadoes, Tornado statistics, United States.**

E–42 551.515.3

Brunt, D., **Tornadoes started by an oil fire.** *Meteorological Magazine*, [London], 61:292–294, **1927.** ref., equation. **DWB**—Account of Hissong's article in *Scientific American*, Dec. 1926. Shown that a tornado which formed over a large oil fire at San Luis Obispo could be explained by the convergence which was produced by the enormous volume of heated air displaced vertically over the zone of the fire. Amounts of energy and air displaced could be estimated fairly accurately. *Subject Headings:* **Tornado formation, Tornado dynamics.**

E–43 551.515.3(767)

*Cole, H. S., **Tornadoes in Arkansas.** *Monthly Weather Review*, 55:176–182, April **1927.** fig., tables. **DWB**—Statistics of 225 Arkansas tornadoes tabulated, showing distribution by months and years, number by months, and comparison of tornado occurrence with thunderstorm occurrence. Discussion. Association of tornado with southeast quadrant of a low is pointed out. *Subject Headings:* **Tornadoes, Tornado statistics, Arkansas.**

E–44 551.515.3

Reeder, George, Cole, H. S., and Shilling, A. W., **Notable tornadoes of May, 1927.** *Monthly Weather Review*, 55:226–227, 1927. **DWB**—Descriptions and analysis of pilot-balloon and kite observations showing abnormal and significant free-air conditions. *Subject Headings:* **Tornadoes, Tornado formation.**

E–45 551.515.3

Letzmann, Johannes, **Zur Methodik der Trombenforschung.** [On the method for whirlwind investigation.] *Meteorologische Zeitschrift*, 45:434–439, **1928.** 4 figs., 5 refs. **DWB**—Determination of path of vortex and sense of rotation from debris. *Subject Headings:* **Whirlwinds, Tornado dynamics.**

E–46 551.515.3

Wegener, Alfred, **Beiträge zur Mechanik der Tromben und Tornados.** [On the mechanics of waterspouts and tornadoes.] *Meteorologische Zeitschrift*, 45:301–214, **1928.** 10 figs., refs. **DWB**—Review and discussion in *Meteorological Magazine*, [London], 64:63–64, April **1929.** Theory introduced that a tornado is the same as the rotating thunderstorm squall cloud, one end of which reaches down to earth. Absence of observations to substantiate theory. *Subject Headings:* **Whirlwinds, Tornado dynamics, Thunderstorms.**

E–47 551.515.3

Letzmann, Johannes, **Eine Trombenbildung in schwach bewegter Luft.** [A whirlwind formation under conditions of light air movement.] *Annalen der Hydrographie und maritimen Meteorologie*, 7:385–392, **1929.** 8 figs., refs. on p. 424. **DLC**—Discussion of a small funnel cloud formation in conjunction with an advancing cold front, near Dorpat, Esthonia. A pilot balloon ascent was made in the immediate vicinity. *Subject Headings:* **Whirlwinds, Tornado formation, Baltic, Esthonia.**

E–48 551.515.3

Markgraf, H., **Drei Trombenberichte.** [Three whirlwind reports.] *Annalen der Hydrographie und maritimen Meteorologie*, 57:14–19, Jan. **1929.** 4 figs., refs. **DLC**—Particular attention given synoptic conditions. *Subject Headings:* **Whirlwinds, Tornado formation.**

E–49 551.515.3

Markgraf, H., **Zur Dynamik der Tromben.** [On the dynamics of whirlwinds.] *Annalen der Hydrographie und maritimen Meteorologie*, 57:19–23, Jan. **1929.** fig., 7 refs., equations. **DLC**—

Basic difference between atmospheric cyclones and tornado-like storms; pressure changes in a whirlwind with vertical axis; influence of change of rotation speed with height; action in a descending funnel cloud; conditions at the heart of a fully developed funnel cloud; differences between cyclonic and anticyclonic funnel clouds; difference between wind and waterspouts. Theoretical conclusions in conjunction with Bjerknes and Letzmann. *Subject Headings:* **Whirlwinds, Waterspouts, Tornado dynamics.**

E–50 551.515.3(73)

Day, P. C., **Weather Bureau gets data on behavior and effects of tornadoes.** U. S. Dept. of Agriculture, Yearbook, **1930.** p. 530–534, fig., 2 tables. **DLC**—Behavior of tornadoes briefly discussed. Method given of statistical reckoning by areas throughout country. Tornado damage. *Subject Headings:* **Tornadoes, Tornado statistics, United States.**

E–51 551.515.3

Justice, Alonzo A., **Seeing the inside of a tornado.** *Monthly Weather Review*, 58:205–206, **1930.** 2 figs. **DWB**—Description of inside as seen from below by eyewitness; hollow and lit up by lightning. *Subject Heading:* **Tornadoes.**

E–52 551.515.3

Letzmann, Johannes and Wegener, Alfred, **Die Druckerniedrigung in Tromben.** [The low pressure in whirlwinds.] *Meteorologische Zeitschrift*, 147:165–169, **1930.** fig., ref., 9 equations. **DWB**—Highly theoretical work dealing with principles of dynamics in whirlwinds. *Subject Headings:* **Whirlwinds, Tornado dynamics.**

E–53 551.515.3

Walker, Gilbert T., **On the mechanism of tornadoes.** *Royal Meteorological Society, Quarterly Journal*, 56:59–66, Jan. **1930.** fig., 7 refs., equations. Discussion. **DLC**—Relationship of rotation of air to rotation of earth; directions of tornado winds and forces discussed briefly. *Subject Heading:* **Tornado dynamics.**

1931–1940

E–54 551.515.3(42)(43)

§Pick, William H., **Tornadoes in England and Germany, June 1931.** *Meteorological Magazine*, [London], 66:125–129, July **1931.** 2 figs. **DLC**—Description and synoptic conditions analyzed. *Subject Headings:* **Tornadoes, England, Germany.**

E–55 551.515.3(54)

Sen, S. N., **Mechanism of Bengal tornadoes in the Nor'wester season.** *Nature*, [London], 127:128–129, Jan. **1931.** fig. **DLC**—Conditions conducive to tornado formation around Bengal described. *Subject Headings:* **Tornadoes, Tornado formation, India.**

E–56 551.515.3(73)

Brown, Charles Wilson, **A study of time-, areal-, and type-distribution of tornadoes in the United States.** *American Geophysical Union, Transactions*, 14:100–106, April **1933.** 5 figs. **DLC**—Detailed study made of 2,017 U. S. tornadoes, considering geographical and seasonal distribution, type of tornado with reference to special meteorological conditions under which it developed, cyclonic or convective conditions, discussion and conclusions. *Subject Headings:* **Tornadoes, Tornado statistics, United States.**

E–57 551.515.3(54)

Das, A. K., **On the mechanism of Indian tornadoes.** *Current Science*, 1(12):418+, **1933.** (Unchecked.)—*Subject Headings:* **Tornadoes, India.**

E–58 551.515.3

Weightman, R. Hanson, **Report of progress in studies regarding the occurrence of tornadoes.** *American Meteorological Society, Bulletin*, 14:99–101, April **1933. DLC**—Discussion of formation theories and typical synoptic conditions. *Subject Headings:* **Tornadoes, Tornado formation.**

E–59 551.515.3(439.1)

§Réthly, Antal, **Forgatagok a Hortobágy felett.** [Whirlwinds of the Hungarian plain.] *Időjárás*, 38:144–148, **1934.** Abstract in German, p. 172. 4 figs., chart. **DWB**—Description and detailed synoptic analysis of occurrence on May 17, 1929. *Subject Headings:* **Whirlwinds, Hungary.**

E–60 551.515.3(261)

Römer, Ernst, **Vorkommen von Tromben auf dem Nordatlantischen Ozean.** [Occurrences of waterspouts in the North Atlantic Ocean.] *Seewart, Nautische Zeitschrift,* 3:105–111, **1934.** 3 tables, 7 refs. **DLC**—Frequency of occurrence of waterspouts noted. Most observed in western part of ocean between 30° and 50°N. *Subject Headings:* **Waterspouts, North Atlantic Ocean.**

E–61 551.515.3(73)

Brown, Charles W. and Roberts, W. O. J., **The distribution of tornadoes in the United States from 1880 to 1931.** *American Geophysical Union, Transactions,* 16:151–158, **1935.** 6 figs., 9 refs. **DLC**—Second statistical study of tornadoes in U. S. based on all data contained in publications of the Weather Bureau from 1880–1931 and considering 3,911 tornadoes. Distribution discussed in U. S.: annual, submonthly, monthly by state groups, by states, areal frequency. Over-all damage noted by states and years. *Subject Headings:* **Tornado statistics, United States.**

E–62 551.515.3(471)

Simojoki, H., **Die Tromben am 6 August, 1932, im inneren Finnland.** [The whirlwinds of Aug. 6, 1932, in the interior of Finland.] Helsingfors, Meteorologischen Instituts der Universitat, Mitteilungen, No. 31. 26 p., 16 figs., 4 tables, refs. **DWB**—Also in *Academie Scientiarum Fennicae, Annales, Ser. A,* 44, No. 7, **1935.**—Descriptive account of occurrence and meteorological conditions. *Subject Headings:* **Whirlwinds, Finland.**

E–63 551.515.3(73)

Brown, C. W. and Roberts, W. O. J., **The areal frequency of tornadoes in the United States by counties, 1880–1931.** *American Geophysical Union, Transactions,* 18:144–146, **1937.** map, 3 refs. **DLC**—Third paper in series of statistical studies of tornado distribution in U. S. County distribution, map and comments. *Subject Headings:* **Tornado statistics, United States.**

E–64 551.515.3(43)

Koschmieder, H., **Die horizontale Trombe von Magdeburg.** [The horizontal funnel cloud at Magdeburg.] *Meteorologische Zeitschrift,* 54:340–344, **1937.** 4 figs., 3 tables, 5 refs. **DWB**—Includes some upper air data, theoretical discussion, etc. Finds Wegener's mechanical theory not very convincing. *Subject Headings:* **Whirlwinds, Tornado dynamics, Germany.**

E–65 551.515.3

†Koschmieder, H., **Über Tornados und Tromben.** [On tornadoes and whirlwinds.] *Naturwissenschaften,* 25:657–664, Oct. **1937.** 7 figs., 63 refs. **DLC**—Abstract in *Science Abstracts,* No. 5283, Dec. **1937.** Comparison between American tornadoes and European "Tromben" given. Conditions for formation are discussed and questioned; experiments devised to illustrate processes. Wegener's dynamical theory and Helmholtz's and Humphreys' thermodynamical theory are critically examined with unsolved difficulties pointed out. *Subject Headings:* **Tornadoes, Whirlwinds, Tornado formation.**

E–66 551.515.3

Letzmann, Johannes, **Richtlinien zur Erforschung von Tromben, Tornados, Wasserhosen und Kleintromben.** [Rules for investigation of whirlwinds, tornadoes, waterspouts, and lesser squalls.] Organisation Météorologique Internationale, (O.M.I.) Klimatologische Kommission, Salzburg, Publication No. 38, p. 91–110, **1937.** 2 figs. **DWB**—Very detailed directions set up for use in tornado observation and reporting. Correspondence included between German and U. S. scientists over plausibility of using Letzmann's detailed observational program. Difficulties pointed out by Americans, p. 85–90. *Subject Headings:* **Tornadoes, Waterspouts, Whirlwinds, Methods of observation.**

E–67 551.515.3

Rodewald, M., **Die Hamburger Höhenwindhose vom 28. Juli 1936.** [The high altitude wind spout of July 28, 1936 near Hamburg.] *Annalen der Hydrographie und maritimen Meteorologie,* 55:21–27, **1937.** 3 figs., table, 2 refs. **DLC**—Detailed meteorological observations made. Wind directions and speeds noted at different heights. *Subject Heading:* **Whirlwinds.**

E–68 551.515.3

Some photographs of tornadoes. *Royal Meteorological Society, Quarterly Journal,* 63:162, April **1937. DWB**—Five selected photographs which represent typical stages in development of tornadoes. Brief explanation of each stage given as well as generalized summary of necessary air mass conditions. *Subject Headings:* **Tornadoes, Tornado formation.**

E–69 551.515.2

Durst, C. S. and Sutcliffe, R. C., **The importance of vertical motion in the development of tropical revolving storms.** *Royal Meteorological Society, Quarterly Journal,* 64:75–82, **1938.** fig., table, 5 refs., 6 equations. **DWB**—It is demonstrated by examination of equations of motion that eviction of air from tropical storms could be explained by the upflow of air from layers of more rapid rotation to those of less rotation. The proposition enumerated may have important inferences in other problems of pressure changes, (tornadoes). *Subject Headings:* **Tropical cyclones, Tornado dynamics.**

E–70 551.515.3(782)

Lemons, Hoyt, **Some meteorological aspects of Nebraska tornadoes.** *Monthly Weather Review,* 66:205–208, **1938.** 8 figs. **DWB**—Definition, general description, synoptic analysis, discussion of tornadic inception, paths, relationships with lows. *Subject Headings:* **Tornadoes, Tornado formation, Nebraska.**

E–71 551.515.3

Petersen, O., **Über die Neigung der Magdeburger Trombe.** [On the degree of inclination of the Magdeburg funnel cloud.] *Meteorologische Zeitschrift,* 55:33–36, Jan. **1938.** 4 figs., equations. **DWB**—Theoretical analysis. *Subject Headings:* **Tornado dynamics, Whirlwinds, Germany.**

E–72 551.515.3(73)

*United States Weather Bureau, **Tornadoes, 1938.** (In its **United States meteorological yearbook, 1938.** Washington, D. C., **1942.** p. 13–31, tables.) **DWB**—Statistical record by states, dates, damage, etc. for that year. Lengthy tables. *Subject Headings:* **Tornado statistics, United States.**

E–73 551.515.2 551.515.3:532

§Brunt, D., **The tropical cyclone and the tornado as revolving fluid.** (In his **Physical and dynamical meteorology,** 2nd ed. Cambridge, Eng., University Press. **1939.** p. 303–306, refs.) **DLC**—Theoretical principles of revolving fluid applied to explanation mainly of tropical cyclones but with some consideration given tornadoes. *Subject Headings:* **Tropical cyclones, Tornado dynamics, Fluid mechanics.**

E–74 551.515.3(476)

§Gaigerov, S. S., **Six tornadoes in the central areas of the European part of the [Soviet] Union, and their synoptic conditions.** *Meteorologiia i Gidrologiia,* Moscow, No. 5, May **1939.** p. 44–54. Translated from Russian by Jacob Chaitkin, U. S. Army Air Corps, Washington, D. C. **1943.** 17 p., 11 figs., 4 refs. (Original and photostat of translation.) **DWB**—Thorough discussion with observations, descriptive accounts and theoretical consideration. Includes several synoptic charts and other diagrams. *Subject Headings:* **Tornadoes, Tornado formation, U.S.S.R.**

E–75 551.515.3 551.515.4(47)

†*Kolobkov, N. V., **Grozy i shkvaly.** [Thunderstorms and squalls.] Moscow, Gidromet. Izdat., **1939.** 200 p., 90 figs., 39 tables, 68 refs., equations. [Translation by Jacob Chaitkin.] (Photostat of translation and of original.) **DWB**—23 p., photos, equations. Chapter 40. Water and land spouts and tornadoes. Chapter 41. Markgraf's comments on Wegener's theory. Chapter 42. Certain comments by author on nature of tornadoes. [Translation by Alexander G. Alexeeff.] Sections 44, 45, 46 on tornadoes. p. 177–189, 10 figs., 4 tables in this section. **DLC**—Account of a tornado condition over a widespread area near Moscow, in 1904, including synoptic situation, analysis of distribution of temperatures and air masses, thunderstorm and hail activity. A detailed description of damages shows activity and direction of devastating winds. Meteorological elements before and after the tornado examined. Data tabulated. Conclusions. Statistics of tornadoes and storms in U. S. A. taken from Yearbook of U. S. Weather Bureau, 1933–1934. Relation of tornadoes and maximum occurrences of sunspots noted. *Subject Headings:* **Tornadoes, Tornado formation, Tornado dynamics, U.S.S.R.**

E–76 551.515.3

Koschmieder, Harald, **Wind- und Wasserhosen.** [Wind spouts and waterspouts.] *Die Umschau in Wissenschaft und Technik,* 43(1):9–11, Jan. **1939.** 6 figs. (Excerpt.) **DWB**—Photos and graphs of waterspouts and tornadoes given. One figure shows thermodynamic theory of tornadoes. *Subject Headings:* **Whirlwinds, Waterspouts, Tornado formation.**

E–77 551.515.3(782)

Lemons, Hoyt, **Temperature and vapor pressure as factors in tornadic inception in eastern Nebraska.** *American Meteorological Society, Bulletin*, 20:49–50, Feb. **1939.** **DWB**—"Shorter contribution." It cannot be inferred here that a definite relationship of the above nature always exists during tornadic genesis, but findings are indicative of possibilities of such relationship. *Subject Headings:* **Tornado formation, Nebraska.**

E–78 551.515.3(43)

Malsch, W., **Beobachtung einer Trombe.** [Observations of a whirlwind.] *Zeitschrift für angewandte Meteorologie*, 56:339–340, **1939.** **MH-BH**—Short tabulated record of upper air winds at time of occurrence. Brief description of occurrence at Nürnberg, Sept. 1939, and meteorological conditions. *Subject Headings:* **Whirlwinds, Germany.**

E–79 551.515.3

On synoptic conditions for tornadoes. *American Meteorological Society, Bulletin*, 20:50-51, **1939.** refs. **DWB**—"Shorter contribution." Quotation from article by Meteorological Physics Division of the Weather Bureau in *U. S. Meteorological Yearbook, 1936*. p. 29–30. Atmospheric conditions from standpoints of pressure distribution, type of air masses, winds aloft and temperature gradients responsible for southeastern tornado series April 1936, are discussed briefly. *Subject Headings:* **Tornadoes, Tornado formation.**

E–80 551.515.3(45)

§Speranza, F., **Osservazioni e descrizioni della tromba che ha interessato Venezia il 24 luglio 1939.** [Observations and description of a whirlwind which occurred at Venice July 24, 1939.] *Rivista di Meteorologia Aeronautica*, 3(3):26–32, **1939.** 8 figs. **DLC**—Description of meteorological conditions attending a tornado including synoptic charts, barograms, thermograms, anemograms, and a sketch of cloud formations. *Subject Headings:* **Whirlwinds, Italy.**

E–81 551.515.3(73)

†§Gaigerov, S. S., **Synoptic conditions accompanying tornadoes in the United States during 1884.** *American Meteorological Society, Bulletin*, 21:229–236, June **1940.** tables, 9 refs. **DWB**—Synoptic charts compiled using some of Finley's data to effect an analysis of the air masses associated with tornadoes. Conclusions drawn on the synoptic conditions of tornado formation in U. S. A similar paper appeared in Russian in *Meteorologiia i Gidrologiia*, 5(4):20–31, **1939,** and included synoptic charts not given in the American publication. *Subject Headings:* **Tornadoes, Tornado forecasting, United States.**

E–82 551.515.3

Humphreys, W. J., **Tornado.** (In his **Physics of the air,** 3rd ed. New York, McGraw-Hill, **1940.** p. 218–224, refs.) **DLC**—Theory of tornado formation is postulated involving the presence of very humid southerly winds, a strongly encroaching anticyclone, and the formation of a mid-air cold front. *Subject Headings:* **Tornadoes, Tornado formation.**

E–83 551.515.3(471)

†*Koschmieder, H., **Über Tromben.** [On whirlwinds.] Berlin, Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen, Vol. 6, No. 3, **1940.** 24 p., 10 figs., 5 plates, 5 tables, 16 refs. **DLC**—Two incidents (at Thiessow, [Rügen], Aug. 1937, and at Dubrovnik, Sept. 1938) of waterspouts from funnel clouds are illustrated and analyzed, including eye-witness accounts, series of photographs showing development and weather conditions. Theories of tornado formation considered at some length; pros and cons of Wegener's theory; the mechanical and thermodynamical theory; author's own form of the thermodynamical theory, in which it is probable that a tornado develops when a warm packet of air rises quickly within a convective mother cloud. *Subject Headings:* **Waterspouts, Tornado formation, Baltic, Balkans.**

E–84 551.515.3(73)

†*Martin, Robert Joseph, **Tornadoes in the United States, 1916–1937, inclusive,** rev. Washington, D. C., **1940.** 13 p., 3 maps, 5 tables, 5 p. of refs. **DWB**—A thorough statistical survey, as well as discussion of origin, occurrence, size, speed, appearance and safety precautions for tornadoes. *Subject Headings:* **Tornadoes, Tornado statistics, United States.**

1941–1950

E–85 551.515.3

*Lloyd, J. R., **The development and trajectories of tornadoes.** *Monthly Weather Review*, 70:65–75, **1942.** 15 figs., refs. **DWB**—Theoretical paper. Investigation recorded of two periods in

March 1938, that substantiate Humphreys' conception of tornado. Tornadoes occur only in connection with upper air cold fronts. Other theoretical details thoroughly treated; synoptic conditions illustrated on charts; wind directions, upper air soundings, rate and direction of motion of tornado, concept of development of tornado vortices, are shown graphically. *Subject Headings:* **Tornadoes, Tornado formation, Tornado dynamics.**

E–86 551.515.3

Hornbaker, Fletcher D., Lundquist, Roland E., and Wissinger, John E., **Tornadoes.** Pasadena, California, California Institute of Technology, 1943. Thesis. refs. (Unchecked.) **DWB**—The period of time used was the 27-year interval from 1916 to 1942. *Subject Heading:* **Tornadoes.**

E–87 551.515

†Lin, C. C., **On the motion of vortices in two dimensions.** University of Toronto Studies, Applied Mathematics Ser. No. 5, Toronto, **1943.** 39 p., 3 figs., 33 refs., extensive equations.—Highly mathematical, technical investigation. *Subject Heading:* **Vorticity.**

E–88 551.515.3(761)

*§Showalter, A. K. and Fulks, J. R., **Preliminary report on tornadoes.** Washington, D. C., Weather Bureau, **1943.** 162 p. **DWB, DLC**—(Two papers.) **The tornado, an analysis of antecedent meteorological conditions,** by A. K. Showalter, p. 3–139. Contains annual and monthly charts of tornado days by states, selected tornado maps, and selected tornado soundings. Sections discuss respectively synoptic conditions associated with tornadoes, a theory of tornado genesis, summary of upper air data associated with recent tornadoes, summary of selected tornadoes in chronological order. Importance of thermal factor is stressed in formation of tornadoes with statistics to bear this out. Suggestion that hail might be initial mechanism to cause tornado, cooling dry air layer below until unstable equilibrium, leaving available convective energy concentrated in lower atmosphere; also necessity of lifting or horizontal convergence to establish free convection, suggested.

Notes on synoptic situation accompanying the Hackleburg, Alabama, tornado of April 12, 1943, by J. R. Fulks, p. 141–162, adiabatic diagram, maps, 3 refs. A thorough analysis of conditions. Hackleburg fitted into a spot just behind receding warm front and in upper cold front—the latter, advancing by latitudinal shear—where conditions, thermal and otherwise, caused tornado. *Subject Headings:* **Tornadoes, Tornado formation.**

E–89 551.515.3:629.13

United States Bureau of Aeronautics, Navy Department, **Tornadoes (involves safety of flying: to be read by all pilots).** Technical Note No. 11–43, Washington, D. C., **1943.** 8 p., chart, 2 maps, 2 photos, 12 refs. **DWB**—Origin and behavior of tornadoes, different types, distribution and frequency of occurrence, are discussed. Precautions for aircraft given. *Subject Headings:* **Tornadoes, Aviation.**

E–90 551.515.3

Jakl, Vincent E., **Pressure gradients, winds and tornadoes.** *Journal of Aeronautical Meteorology*, 1:16–22, **1944.** 4 figs., 11 equations. **DLC**—Theoretical discussion, with consideration of basic wind pressure principles involved in circular depressions and giving equations applicable to tornado pressures. It is concluded that a tornado occurs in a thermal area with a synoptic situation for frontal thunderstorms and with other favoring conditions of humidity, etc. Author considers Showalter's theory for generation of necessary superadiabatic lapse rate quite plausible. *Subject Headings:* **Tornadoes, Tornado formation, Tornado dynamics.**

E–91 551.515.3(73)

*Baldwin, J. L., **Preliminary report on tornadoes in the United States during 1945.** *Monthly Weather Review*, 73:207–209, **1945.** tables. **DWB**—Such a report appears each year 1929 to date, in December issue of *Monthly Weather Review*. Authors of others are J. L. Baldwin, W. A. Mattice, J. P. Kohler, etc. Reports cite salient facts of records and tabulate by states statistics of tornadoes, deaths, injuries and dollar damage. *Subject Headings:* **Tornadoes, Tornado statistics, United States**

E–92 551.515.3(485)

†*Båth, Markus, **An investigation into three tornadoes in Sweden.** Meteorologiska Institutionen vid Kungliga Universitetet, Uppsala, Meddelande No. 10, p. 266–317, **1946.** 23 figs., 11 tables, 27 refs., equations. **DLC**—Also in *Geografiska Annaler*, 27:255–317, **1945. DLC**—Thorough paper includes descriptions of these three occurrences with illustrations of damage, notes on synoptic situation, maps, etc. Calculation of the energy in a tornado is extensively considered, discussing respectively: lability energy of the warm air, energy of the horizontally unstable condition of the cold

front, kinetic energy of the tornado, and a comparison between the energy sources and the kinetic energy. *Subject Headings:* **Tornadoes, Tornado dynamics, Sweden.**

E–93 551.515.3(42)

Hawke, E. L., **Tornado-like development in the line-squall of January 18th, 1945, on Dunstable Downs.** Typescript of *Meteorological Magazine*, p. 5–6, Feb–July **1945.** Notes by A. R. Maxwell and S. E. Ashmore, p. 6–7. 2 photos (of damage). (Unchecked.)—*Subject Headings:* **Tornadoes, Squalls, England.**

E–94 551.515.3(931)

Seelye, C. J., **Tornadoes in New Zealand.** *New Zealand Journal of Science and Technology, (B)*, 27:166–174, **1945.** 5 figs., 4 tables, ref. **DLC**—Distribution, frequency, weather analyses and brief descriptions of several incidents of tornadoes in New Zealand are given. *Subject Headings:* **Tornadoes, New Zealand.**

E–95 551.515.31

†Swoboda, G., **Zur Thermodynamik der Trombenbildung.** [On the thermodynamics of tornado formation.] *Experientia*, 1:180–183, Sept. **1945.** 2 figs., 17 refs. Summary in English. **DLC**—Koschmieder's thermodynamical theory of tornado formation is discussed. Three conditions indicated under which supplementary amounts of potential energy to start tornado convection can become available in a cumulonimbus. The moisture content of the air from below is considered to be as important a factor as its warmth. *Subject Headings:* **Whirlwinds, Tornado formation.**

E–96 551.515.3(754)

Finlayson, John L., **Shinnston tornado.** New York, Hobson, **1946.** 200 p., diagrs., photos. **DLC**—Descriptive accounts by witnesses, victims, and newspapers, including a U. S. Weather Bureau report. *Subject Headings:* **Tornadoes, West Virginia.**

E–97 551.511

Haurwitz, B., **Horizontal wind shear and the generation of vorticity.** *Journal of Meteorology*, 3:24–25, March **1946.** fig., ref., 3 equations. **DLC**—Attempt is made to account for the difference in the distribution of convergence and divergence in disturbances of lower and higher latitudes. Technical, mathematical paper. *Subject Heading:* **Vorticity.**

E–98 551.515.3 551.515.4

†Koschmieder, Harald, **Über Böen und Tromben.** [On squalls and whirlwinds.] Parts I–III, *Naturwissenschaften*, 33:203–211, 235–238, **1946.** 23 figs., 20 refs. **DLC**—I. [Dry or half-dry cold air outbreaks.] II. [Thunder squalls.] III. [Whirlwinds.] Explanations, photographs, diagrams, and theoretical discussion of formation and development of the three types of storms. *Subject Headings:* **Whirlwinds, Thunderstorms.**

E–99 551.515.3(764)

Meeker, R. I., **An incompletely developed tornado at Ft. Worth, May 25, 1945.** Abstract of talk given to North Texas A. M. S. Seminar. *American Meteorological Society, Bulletin*, 27:61, **1946.** **DWB**—Weak tornado described. Accompanying meteorological conditions analyzed. *Subject Headings:* **Tornadoes, Texas.**

E–100 551.515.3(761)

Pate, F. C., **The tornado at Montgomery, Alabama, February 12, 1945.** *American Meteorological Society, Bulletin*, 27:462–464, **1946.** 3 figs. **DWB**—Called "most officially observed" tornado in history. Thorough description given and a chart of accompanying wind, temperature, and moisture conditions aloft. *Subject Headings:* **Tornadoes, Alabama.**

E–101 551.511

Platzman, George W., **Some remarks on the measurement of curvature and vorticity.** *Journal of Meteorology*, 4:58–62, April **1947.** 6 figs., 6 refs., 8 equations. **DLC**—Formulas are presented for measuring the curvature of spherical curves and the vorticity of spherical motion. Properties of the polar stereographic projection are considered, and applications made to the theory of constant-vorticity trajectories. *Subject Heading:* **Vorticity.**—*Author's abstract.*

E–102 551.515.3

Schmidt, F. H., **Zur Thermodynamik der Trombenbildung.** [On the thermodynamics of whirlwind formation.] *Experientia*, 2:493–495, **1946.** 2 figs., 4 refs. Abstract in English. **DLC**—Two further processes described which might produce the supplementary energy necessary to start

tornado formation according to Koschmieder's theory: 1) development of further upward accelerations from a state of latent conditional instability bordering a cumulonimbus, 2) upward accelerations originating in cumulonimbus itself if supercooled water drops freeze at once. *Subject Headings:* **Whirlwinds, Tornado formation.**

E–103 551.515.3(54)
Veryard, R. G., **The tornado.** *Weather*, 1:89–91, **1946.** 3 photos (of a tornado at Peshawar, 1933), refs. **DWB**—Author states briefly what a tornado does, what it is, and why it happens. A correction of statistics in this article appears by H. E. Landsberg, "Tornadoes in the U. S. A.," *Weather*, 2:149, **1947.** *Subject Headings:* **Tornadoes, India.**

E–104 551.515.3(42)
Manley, Gordon, **Tornadoes in England.** *Weather*, 2:238–240, **1947.** refs. **DWB**—Records of individual observations of tornado-like clouds in England. *Subject Headings:* **Tornadoes, England.**

E–105 551.515.3(778)
Brooks, Edward M., **Some characteristics of tornadoes in 1948 near St. Louis.** *American Meteorological Society, Bulletin*, 29:520–521, **1948.** **DWB**—Abstract of paper read at Philadelphia meeting of American Meteorological Society, Sept. 1948, with discussion by Landsberg, C. F. Brooks, and Reichelderfer. *Subject Headings:* **Tornadoes, Missouri.**

E–106 551.515.3(73)
C[ameron], D. C., **The tornado story of 1948.** *Weatherwise*, 1:55, June **1948.** **DWB**—Brief report citing some description of tornadoes and damage of first four months of 1948. *Subject Headings:* **Tornadoes, United States.**

E–107 551.513.3(782)
K[ocourek], F., **Smršť, vichřice a silný vitr jako živelni pohroma.** [Waterspouts, tornadoes and gales as destructive forces.] *Meteorologiscké Zprávy*, 2:102–103, **1948.** 4 photos (a series of a tornado in Nebraska, July 24, 1930). **DWB**—*Subject Headings:* **Tornadoes, Waterspouts, Nebraska.**

E–108 551.515.3(73)
Wolford, Laura V., **Tornadoes in the United States during 1948.** *Monthly Weather Review*, 76:273–275, Dec. **1948.** map (showing tornado tracks of 1948), table. **DWB**—Statistical report. *Subject Headings:* **Tornado statistics, United States.**

E–109 551.515.3
Brooks, Edward M., **The tornado cyclone.** *Weatherwise*, 2:32–33, **1949.** figs., photo. **DWB**—Synoptic situation and microbarograph trace at time of tornado near St. Louis shown. Conditions during a tornado cyclone which accompany a more local tornado are given; importance of tracking the tornado cyclone for tornado warning service is stressed. *Subject Headings:* **Tornadoes, Tornado forecasting.**

E–110 551.515.3
Chiplonkar, M. W., **The life-history of a typical funnel cloud.** *Current Science*, 18(10):368–370, Oct. **1949.** 6 figs., 9 refs. **DLC**—Description and drawings of a funnel cloud observed at Dum Dum, 10 miles NE of Calcutta. Very little meteorological data. *Subject Headings:* **Whirlwinds, India.**

E–111 551.515.3(267)
Davy, E. S., **Unusual damage by a tornado.** *Weather*, 4:156–157, May **1949.** **DWB**—Brief report of small tornado in May at Mauritius, South Indian Ocean, which furrowed and blackened a tennis court. *Subject Headings:* **Tornadoes, Mauritius, Indian Ocean.**

E–112 551.515.3(73)
Flora, S. D., **The nature of tornadoes.** *Weatherwise*, 2:27–30, 39, **1949.** chart (showing monthly variation in tornado days in U. S.), 3 photos, 2 tables. **DWB**—General discussion of tornadoes, meteorological conditions, formation, size, region, path, duration, destruction, and how to escape. *Subject Headings:* **Tornadoes, United States.**

E–113 551.515.3:551.515.2(759)
Gray, Richard W., **Florida hurricanes.** *Monthly Weather Review*, Jan. 1933, rev. and reprinted Washington, D. C. **1936** and **1949.** Revised by Grady Norton. **DWB**—A section discusses briefly occurrences of tornadoes in connection with hurricanes. *Subject Headings:* **Tornadoes, Hurricanes, Florida.**

E–114 551.515.3(775)

Jakl, V. E., **The Madison, Wisconsin, tornado of July 23, 1944.** Chicago, June 1949. 4 p. manuscript. (Weather Bureau Office, Chicago, Ill.) 6 figs. (from photos of successive stages of tornado), 7 equations. **DWB**—Thorough, detailed notes of physical characteristics of this occurrence are used for mathematical computations to calculate gyratory velocities. "Chimney blast" theory of a strong current in a central core of the tornado is disputed. *Subject Headings:* **Tornadoes, Tornado dynamics, Wisconsin.**

E–115 551.515.3:532

McGurrin, Martin, **Principles of open channel flow applied to the formation of tornadoes.** San Bruno, California, U. S. Weather Bureau, 1949. (Its unpublished research report.) 30 p., 10 figs., 5 refs., equations. (Contains original drawings with overlays by John C. Freeman, Jr., and Morris Tepper.) **DWB**—It is suggested that the laws governing open channel flow, including the mechanics of the hydraulic jump and related phenomena, apply in the field of meteorology and explain the generation and maintenance of tornadoes. The equations of single fluid flow are modified to apply to density currents as exist in the atmosphere. The equations pertaining to tornadic conditions are included. *Subject Headings:* **Tornado formation, Tornado dynamics, Fluid mechanics.**—*Author's abstract.*

E–116 551.515.3

*§Syono, Sigekata, **Generation of spouts.** Tokyo University, Geophysical Institute, Japan. *Collected Meteorological Papers*, Vol. 2, No. 8, July 1949. 8 p., 6 figs., 4 tables, 3 refs., equations. **MH-BH**—Author proposes a quantitative theory in which dynamic and thermodynamic considerations are equally important to the formation of tornadoes, and in which the initial vertical shear required is not so large as in the theory of Wegener. Diagrams showing circulation systems, adiabatic charts, synoptic chart, tabulated observations, are included. *Subject Headings:* **Tornadoes, Waterspouts, Tornado formation.**

E–117 551.515.3:551.594.6:551.501.81

Tornado prediction. *Newsweek*, 35(7):52, Aug. 15, 1949. photo. **DLC**—Report of work being done at Oklahoma Institute of Technology, Stillwater, under the direction of Clark A. Dunn and H. L. Jones, on tracing and predicting of tornadoes by radar which records a different picture of tornado lightning than of ordinary lightning. It is believed that a brewing tornado can be detected 100 to 200 miles away. A system is being worked out to plot the storm's course. *Subject Headings:* **Tornadoes, Tornado forecasting, Radar storm detection.**

E–118 551.515.3

U. S. Weather Bureau, **Tornadoes.** [On back of Daily Weather Map (Washington), June 13, 1949.] 2 charts, 4 photos. **DWB**—Comprehensive but popular article giving brief discussion of cause of tornadoes, destructive effects, safety measures, some individual occurrences, and general characteristics of time, path, wind speeds, clouds, precipitation and sound. *Subject Heading:* **Tornadoes.**

E–119 551.515.3(73)

U. S. Weather Bureau, *United States Yearbook of Meteorology.* Washington, D. C., 1937–1949. **DLC**—Review of tornadoes each year. *Subject Headings:* **Tornado statistics, United States.**

E–120 551.515.3(766)

†Asp, M. O., **Tornadoes in Oklahoma.** *Monthly Weather Review*, 78:23–27, Feb. 1950. figs., tables, refs. **DWB**—Summary of all Oklahoma tornadoes. *Subject Headings:* **Tornado statistics, Oklahoma.**

E–121 551.515.3

Brooks, Edmond, **Tornadoes and related phenomena.** *Meteorological Compendium*, American Meteorological Society, to be published in 1950.—Weather conditions associated with tornado occurrence are reviewed, along with properties of central pressure and wind speed, flow pattern, turbulence, visibility of a tornado, appearance, sound and odor. Theories on causes of tornado formation and maintenance are postulated, with discussion of energy for vertical motion, horizontal motion as a source of energy, and cause of the low pressure in a tornado. Protection of life and property is considered, as well as forecasting and tracking, and suggestions are given for further study of the problems. A small section takes up other whirlwind-type phenomena. *Subject Heading:* **Tornadoes.**

E-122 551.515.3

Fawbush, E. J. and Miller, R. C., **A practical method of determining areas of probable tornado formation—preliminary report.** Paper read at the American Meteorological Society, 30th Anniversary Meeting, St. Louis, Mo., Jan. **1950.**—Abstract in Program of Meeting. *Subject Heading:* **Tornado forecasting.**

E-123 551.515.3:551.509

Fawbush, E. J., **Forecasting tornadoes.** (In manuscript form at Tinker Air Force Base, Oklahoma City, Oklahoma.)—The author has combined numerous ideas and factors into one simplified method of forecasting, with which he has had excellent success in forecasting strong winds, severe thunderstorms, and tornadoes. Careful study of synoptic situation, especially stability, moisture content, pattern of moisture distribution, and flow pattern in advance of cold fronts and squall lines emphasized. *Subject Heading:* **Tornado forecasting.**

E-124 551.515.3

Flora, Snowden D., **Tornadoes.** (Book in preparation, manuscript form, U. S. Weather Bureau, Topeka, Kansas. To contain about 250 p., charts, photos, tables.)—Book is to be written in popular style and will contain discussion of tornado characteristics and statistics. There will be sections dealing with causes, forecasts and warning systems for tornadoes, safety measures, and tornado-proof buildings, tornadoes in other parts of the world, and tornado freaks. Charts, photos, and tables will be included. *Subject Headings:* **Tornadoes, Tornado statistics.**

E-125 551.515.3:551.594.6:551.501.81

Jones, Herbert L., **The identification and tracking of tornadoes.** Paper read at the Joint Meeting of the International Scientific Radio Union and Institute of Radio Engineers. Washington, D. C., April **1950.** 12 figs. (Mimeographed.) **DWB, MH-BH**—Research work at Oklahoma A. and M. indicates the possibility of identifying and tracking tornadoes by means of characteristic lightning discharges. Evidence shows that electrical discharges from tornadoes are much different from those observed during an ordinary thunderstorm; the tornado discharges are reputed to be more violent with an energy concentration in the blue end of the spectrum. Sferics during a tornado are observed to be much greater n magnitude than sferics resulting from other types of storms. New electronic equipment has been developed for recording only those sferics above a given preset level. Direction indicating equipment has also been assembled for trial in spring of 1950. *Subject Headings:* **Sferics, Radar storm detection, Tornado forecasting.**

E-126 551.515.3

Phillips, P. E., **Flight through cloud funnel of waterspout.** *Meteorological Magazine,* [London], 79:24–25, Jan. **1950. DWB**—Brief account of deliberate flight through funnel at 600 ft. altitude. Pilot noted no particular increase in turbulence; no precipitation, yet plane emerged wet. No facts on disturbance at sea's surface. *Subject Heading:* **Waterspouts.**

E-127 551.515.3

Reynolds, George W., **Theoretical estimation of the forces necessary to accomplish certain phenomena resulting from tornadoes.** American Meteorological Society, 30th Anniversary Meeting, St. Louis, Mo., Jan. 1950.—Abstract in Program of Meeting. To be published in *American Meterological Society, Bulletin,* about summer, **1950.** *Subject Heading:* **Tornado dynamics.**

E-128 551.515.3

Reynolds, George W., **A systematic method for reporting tornado data applied to a tornado of 21 May 1949.** Thesis, Graduate Board, St. Louis University, **1950.** 102 p.—*Subject Headings:* **Tornadoes, Tornado statistics.**

E-129 551.515.3:551.515.82

Tepper, Morris, **A proposed mechanism of squall lines: the pressure jump line.** *Journal of Meteorology,* 7:21–29, Feb. **1950.** 15 figs., table, 16 refs. **DWB**—From author's abstract: Speculation on genesis of tornadoes. Proposed that the precold-frontal squall line may be explained as a pressure jump induced by accelerations along a cold front and moving along an inversion in the warm sector as a gravitational wave. It has also been suggested that the violent shower activity which is associated with such squall lines is set off by the passage of the pressure jump under suitable thermodynamic conditions. Speculatively it is proposed, by analogy to the theory of supersonic flow and shock waves, that the zone of interaction of two pressure jump lines is a preferred zone for tornado formation. *Subject Headings:* **Tornadoes, Tornado formation, Pressure jump.**

E–130 551.515.3:551.515.82

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E–131 551.515.3

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Martin, Robert Joseph, **Tornadoes in the United States, 1916–1917, inclusive.** (Manuscript.) **DWB**—One hundred and twelve references listed at end of article. *Subject Headings:* **Tornadoes, Bibliographies, United States.**

E–136 551.515.3:016

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E–137 551.515.3:016

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E–143 Gaylord, Willis, **Account of a tornado.** *American Journal of Science*, 37:90–93, **1839. MH.**—Description of tornado in Onondaga Co., N. Y.

E–144 Hare, R., **Notices of tornadoes.** *American Journal of Science*, 38:73–86, **1839.** refs. **DLC**—Account of tornado at Providence, R. I., and of one near Paris. It is proposed that volume of uprushing air exceeds that of inflowing air, thereby leaving relatively low pressure at center of tornado.

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E–148 Chappelsmith, John, **Account of a tornado near New Harmony, Ind., April 30, 1852, with a map of the track, etc.** *Smithsonian Contributions to Knowledge*, 59, Washington, D. C., **1855.** 11 p., 2 figs., plate.—Description.

E–149 Darlington, Richard, Jr., **A full description of the great tornado in Chester County, Pa.** West Chester, Pa., **1877.** 28 p., figs. **DLC.**

E–150 Daniells, W. W., **The Wisconsin tornadoes of May 23, 1878.** 41 p. 2 plates. **DWB**—Detailed description.

E–151 Wadsworth, J. L. R. and Nipher, Francis E., **Tornado of April 14, 1879.** *Academy of Science, St. Louis, Transactions*, 4(1):2–20, **1879.** diagr. **DWB**—Description.

1881–1900

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E–157 Finley, J. P., **Tornado studies for September, 1886,** *Monthly Weather Review*, 14:257–259, **1886,** 2 tables. **DWB**—Description of meteorological conditions and occurrences. Data well tabulated.

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E–159 Faye, M. H., **Relations between cyclones, thunderstorms and tornadoes,** Mimeograph translation, 22 p., from a paper, "Sur les tempêtes, théories et discussions nouvelles." [On storms, new theories and discussion]. Paris **1887. DWB.**

***E–160** Finley, J. P., **Tornadoes: what they are and how to observe them, with practical suggestions for the protection of life and property.** New York, **1887.** 196 p., figs., maps, 23 tables.—Extensive work containing much data.

†E–161 Finley, J. P., **Tornadoes, what they are and how to escape them.** Washington, D. C., **1888.** 90 p., figs., maps, 6 tables, 9 refs.

***E–162** Finley, J. P., **Illinois tornadoes for 54 years, 1835–1887. Iowa tornadoes for 51 years, 1837–1887. The tornadoes of Kansas for 29 years, 1859–1887.** Three separate pocket manuals, each published in Washington, D. C., **1888,** and each having 10 p. 2 figs., map, 4 tables.—Statistical reports.

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E–164 Hazen, Henry A., **Position of a tornado in a general storm.** *American Meteorological Journal*, 5:43–44, **1888. DLC**—Short note stating difference in Finley's and Hazen's theories of point of tornado occurrence.

E–165 Hinrichs, Gustavus, **Tornadoes and derechos.** *American Meteorological Journal*, 5:306–317, 341–349, 385–393, Nov. **1888.** maps. **DLC**—Discussion of tornadoes in general and in Iowa in particular. Derecho described as "straight blow of the prairies."

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E–172 Rotch, A. Lawrence, **A French tornado.** *American Meteorological Journal*, 7:577–580, **1891.** 2 figs. **DLC.**

E–173 Santee, Thomas, **Notes on the tornado of August 19, 1890, in Luzerne and Columbia counties.** Paper read before Wyoming Historical and Geological Society, Dec. 12, 1890. Wilkes-Barre, Pa., **1891.** 51 p., map. **DWB**—Description.

E–174 **The story of a storm; a history of the great tornado at Pomeroy, Calhoun County, Iowa, July 6, 1893.** Chicago, H. O. Shepard Co., **1893.** 228 p., diagr., photos. **DWB**—Mostly actual experiences.

E–175 Baier, Julius, **Low pressure in St. Louis tornado.** *Monthly Weather Review*, 24:332, **1896.** table. **DWB**—Special study of low pressure observed at center of St. Louis tornado.

E–176 Cline, Isaac M., **Report on the tornadoes of May 12 and 15, 1896, in northern Texas.** U. S. Weather Bureau Climate and Crop Service, Texas Section, Special Bulletin No. 8. Galveston, **1896.** 3 p., 2 synoptic charts, diagr. (showing tornado paths).—Description.

E–177 Curzon, Julian, **The great cyclone [tornado] at St. Louis and East St. Louis, May 27, 1896.** Being a full history of the most terrifying and destructive tornado in the history of the world, with numerous thrilling and pathetic incidents and personal experiences of those who were in the track of the storm. St. Louis Cyclone Publ. Co., **1896.** 416 p. Many photos. **DWB, DLC**—Lengthy description.

E–178 Frankenfield, H. C., **The tornado of May 27 at St. Louis, Mo.** *Monthly Weather Review*, 24:77–81, **1896.** table. **DWB**—Extensive description of synoptic conditions and destruction.

*E–179 Hoffman, Frederick L., **Tornadoes and tornado insurance; a compilation of the most trustworthy and important data relating to the destruction of life and property through violent storms.** New York, **1896.** 22 p. tables of tornado losses. **DLC**—General discussion of tornadoes from insurance point of view.

E–180 **Photographic views of the great cyclone [tornado] at St. Louis, May 27, 1896** . . . giving a graphic and accurate resume of its deadly and destructive work by means of the pen and camera. St. Louis, **1896.** photos. **MH**—Description.

E–181 Sachs, W. P., **The tornado's awful work.** *Concordia Magazine*, 1(7):385–403, **1896.** photos. **MH**—Description of St. Louis tornado and damage.

E–182 Faye, [M]. H., **Nouvelle étude sur les tempêtes, cyclones, trombes, ou tornados.** [Recent study on storms, cyclones, whirlwinds, or tornadoes.] Paris, **1897.** 140 p., 17 figs., refs.—Part 1. Trombes ou tornados. Observations of particular storms in France; theory of tornadoes, precautions, etc.

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E–184 Smith, James W., **Tornadoes.** *Strand Magazine*, p. 266–272, Oct. **1897.** photos. (Excerpt.) **DWB.**

E–185 Abbe, Cleveland, **Tornadoes.** *Century Magazine*, 58:596–598, Aug. **1898.**—Short discussion on frequency and danger of tornadoes. Brief treatment of meteorological factors.

E–186 Bigelow, F. H., **Cyclones, hurricanes, and tornadoes.** U. S. Dept. of Agriculture, Yearbook, Washington, D. C., **1898.** p. 525–534. **DA**—Section on tornadoes briefly considers accompanying synoptic conditions.

E–187 Musick, John R., **In the whirl of the tornado.** A personal experience. *Century Magazine*, 58(4):591–596, **1898.**—Dramatic description of a tornado by an eyewitness.

E–188 Schrenk, Hermann von, **The trees of St. Louis as influenced by the tornado of 1896.** *Academy of Science, St. Louis, Transactions*, 8(2):25–41, Jan. **1898.** 9 figs. (Excerpt.) **DWB.**

E–189 Abbe, Cleveland, **The prediction of tornadoes and thunderstorms.** *Monthly Weather Review*, 27:159–160, **1899.** **DWB**—Difficulties enumerated. Inconclusive.

E–190 Emery, S. C., **Tornadoes in Tennessee, Mississippi, and Arkansas.** *Monthly Weather Review*, 28:499, **1900.** 2 figs. **DWB**—Descriptive accounts, considering meteorological conditions, damage.

1901–1920

E–191 Lamb, Fred W., **The great tornado of 1821 in New Hampshire.** Manchester, N. H., **1908.** 15 p.—Description.

§E–192 Billett, H., **The South Wales tornado of October 27, 1913.** *Great Britain, Meteorological Office, Geophysical Memoirs*, 2(11):6–15, **1914.** 8 figs., 5 plates. **DWB**—Description and synoptic analysis. Also note on pressure oscillations observed on Aug. 14, 1914.

E–193 Condra, G. E. and Loveland, G. A., **The Iowa-Nebraska tornadoes of Easter Sunday, 1913.** *American Geographical Society, Bulletin*, 46:100–107, Feb. **1914. DLC**—Map shows paths of tornadoes. Weather conditions recorded. Five tornadoes described.

E–194 Helffrich, —, **Wolkentrichter.** [Funnel cloud.] *Meteorologishe Zeitschrift*, 34:330, **1917.** fig. **DLC**—Brief description of a funnel cloud accompanying a thunderstorm near Heidelberg.

E–195 Giles, Albert W., **A Virginia tornado.** *Monthly Weather Review*, 46:460–464, **1918.** 8 figs., Discussion by C. F. Brooks with pressure-temperature charts. **DWB**—Thorough description of occurence and damage with weather analysis.

E–196 Henry, A. J., **Cyclones, tornadoes, thunderstorms, squalls.** *Monthly Weather Review*, 46:23-25, **1918. DWB**—Distinctions between different types of storms are clarified briefly. Appearance of clouds as forewarning of tornado.

E–197 Byers, E. H., **Tornado near Hobbs, New Mexico, September 19, 1919.** *Monthly Weather Review*, 47:630–640, **1919.** fig. **DWB**—Description.

E–198 F[lora], S[nowden] D., **Tornadoes of Oct. 8, 1919.** *Monthly Weather Review*, 47:728, **1919.** fig. Discussion by C. F. Brooks. **DWB**—Description and meteorological analysis.

E–199 Gray, R. W., **A tornado within a hurricane area,** *Monthly Weather Review*, 47:639, **1919.** 5 figs. **DWB.**

E–200 Loveland, G. A., **Tornadoes in eastern Nebraska, April 6, 1919.** *Monthly Weather Review*, 47:234–236, **1919.** fig., 7 photos. Discussion by C. F. Brooks. **DWB**—Descriptions and weather analysis.

E–201 Lyman, H., **Tornado at Fergus Falls, Minnesota, June 22, 1919.** *Monthly Weather Review*, 47:392–393, **1919.** 3 figs. Discussion by C. F. Brooks. **DWB**—Description and weather analysis.

E–202 Smyth, P. H., **Tornado in southern Alabama, March 5, 1919.** *Monthly Weather Review*, 47:237, **1919.** 2 figs. **DWB**—Brief description and weather analysis.

E–203 Humphreys, W. J., **The tornado and its cause.** *Monthly Weather Review*, 48:212, **1920. DWB**—Conditions for tornado formation discussed.

E–204 Lindgren, G. S., **Tornado in Union County, N. C., April 21, 1920.** *Monthly Weather Review*, 48:210–211, **1920. DWB**—Description.

E–205 Mitchell, Charles L., **Tornadoes of March 28 in northeastern Illinois.** Climatological Data: Illinois Section, March 1920. Springfield, **1920. DWB**—Description.

E–206 Ruhle, J. A., **Tornadoes in northeastern Oklahoma, May 2, 1920.** *Monthly Weather Review*, 48:211, **1920. DWB**—Description.

E–207 Ward, Robert DeC., **Tornadoes of the United States.** Smithsonian Report for 1918, Pub. 2552, Washington, D. C., **1920.** p. 139–145, fig., photo.—Brief discussion of nature of tornadoes, damage, distribution, weather conditions, protection.

1921–1930

E–208 Desio, Ardito, **Su un turbine atmosferico che investi Roma nel 1749.** [On a whirlwind which invaded Rome in 1749.] Estratto dalla Rivista Geografica Italiana, anno 29, **1922.** 7 p., fig., charts, refs. **DWB.**

E–209 Simonds, Frederic W., **The Austin, Texas, tornadoes of May 4, 1922.** University of Texas Bulletin, No. 2307, Feb. **1923.** 24 p., 17 plates. **DWB**—Description with good photos.

E–210 Hunter, H. C., **The Lorain, Ohio, tornado, June 28, 1924.** *Monthly Weather Review*, 52:309–310, **1924.** photo. **DWB**—Description.

E–211 Pickwell, Gayle, **Tornadoes. The funnel clouds.** *Nature Magazine*, 3:147–150, March **1924.** 7 photos. (Excerpt.) **DWB**—General consideration of tornadoes and accompanying weather conditions. Good pictures; three are a development sequence. Description of a Missouri tornado.

E–212 Christensen, Arthur H., **Tornadoes in Iowa during June, 1925.** *Monthly Weather Review*, 53:314, **1925. DWB**—Brief table.

E–213 **Engineers study tornado forces.** *Illinois Central Magazine*, Chicago, Sept. **1925.** p. 14–16.—Investigation on houses to withstand tornadoes.

E–214 Henry, Alfred J., **The tornadoes of March 18, 1925.** *Monthly Weather Review*, 53:141–145, **1925.** 4 figs., 2 charts, table. **DWB**—Meteorological conditions discussed; barograph traces; tornado paths with reference to center of cyclone. Damage; tornado-resistent structures.

E–215 Hunter, Herbert C., **Tornadoes of the U. S., 1916–1923.** *Monthly Weather Review*, 53:198–204, **1925.** 2 figs., 3 tables, 11 refs. **DWB**—Statistics of tornadoes by state, year, frequency, damage, etc.

E–216 Nunns, Thomas, **A waterspout in latitude 53°N.** *Monthly Weather Review*, 53:399, Sept. **1925.** (Brief note accompanying photo.) **DWB**—Spout occurred near North Battleford, Saskatchewan, July, 1923.

E–217 **Tornadoes in Hungary.** *American Meteorological Society, Bulletin*, 6:63–64, April **1925. DWB**—Five tornadoes reported in previous 40 years. Brief account of one.

E–218 Western Society of Engineers, Committee, **Report on effects of tornado of March 18, 1925, also suggestions in regard to design of structures.** *Western Society of Engineering, Journal*, 30(9):373–396, Sept. **1925.** 19 figs. (Excerpt.) **DWB.**

E–219 Blanchard, W. O., **Murphysboro tornado.** *Scientific Monthly*, 23:435–446, **1926.** 15 figs., 3 tables. **DLC**—Description and synoptic conditions.

E–220 Hissong, J. E., **Whirlwinds at oil-tank fire, San Luis Obispo, Calif.** *Monthly Weather Review*, 54:161–163, **1926.** 5 photos. **DWB**—Whirlwinds and tornadoes caused by great heat of fires are described and briefly analyzed.

*E–221 Hoffman, Frederick L., **Windstorm and tornado insurance.** New York City, Spectator Co., **1926.** 109 p., map, photos, tables. **MH-BH**—General discussion of storms, including mostly tornadoes, occurrence, causes, examples, damage, as well as thunderstorm and hail damage. a discussion of the Weather Bureau's tornado records over the years, and insurance problems, rates, experiences, etc.

E–222 Shipman, T. G., **An underdeveloped tornado.** *Monthly Weather Review*, 54:168, **1926. DWB**—Description. Damage was by straight blows.

E–223 Busk, H. G., **Land waterspouts.** *Meteorological Magazine*, [London], 61:289–291, Jan. **1927.** 2 figs. **DWB**—A hollow column of air and dust described, as seen in Persia, 1915. Distinguished from an ordinary dust devil.

*E–224 Giles, Albert W., **Tornadoes in Virginia, 1814–1925.** *Monthly Weather Review*, 55:169–175, April **1927.** fig., 7 tables. **DWB**—Mostly statistical treatment. Some discussion of distribution, time, season, etc. of occurrences.

E-225 Hunt, H. A. and Humphreys, W. J., **Australian vs. American tornado frequency.** *American Meteorological Society, Bulletin*, 8:128–129, Sept. 1927. **DWB**—Two letters discussing Australian and American tornado frequency.

E-226 La Ville, H. C., **St. Louis tornado.** *Stone and Webster Journal*, 41:680–688, Nov. 1927. diagr., photos.

E-227 Samuels, L. T., **Washington, D. C., tornado of May 14, 1927.** *Monthly Weather Review*, 55:227, **1927. DWB**—Description.

E-228 Shipman, T. G., **Observing a tornado's life.** *Monthly Weather Review*, 55:183–184, **1927.** 3 refs. **DWB**—Description and synoptic conditions of tornado at Fort Smith, April 12, 1927.

§E-229 Engineers' Club of St. Louis and St. Louis Chapter, American Institute of Architects, Joint Committee, **Report of the St. Louis tornado of Sept. 29, 1927.** St. Louis, **1928.** 32 p., 27 photos, 6 daily weather maps.

E-230 Flora, S. D., **New high mark for tornado in 1927.** *Rough Notes*, Part 1, p. 17–18, Feb. 1928. (Excerpt.) **DWB**—Statistical account for insurance interests.

E-231 Greening, G. K., Jr., **The Middle Missouri Valley tornadoes, Sept. 13, 1928.** *Monthly Weather Review*, 56:353–354, **1928.** table (of damage). **DWB**—Description.

E-232 Hurd, W. E., **Waterspouts.** *Monthly Weather Review*, 56:207–211, **1928.** 10 refs. **DWB**—Comprehensive discussion, treating numerous characteristics and conditions of occurrence.

E-233 Schlomer, W. B., **Tornado at Cincinnati, Ohio, Jan. 19, 1928.** *Monthly Weather Review*, 56:15, **1928. DWB**—Brief description and meteorological conditions.

E-234 Teesdale, L. V., **Tornado-resistent construction of buildings possible by venting.** April 16, **1928.** 13 p. Mimeographed. **DWB.**

E-235 Weck, Fred H., **The Rockford, Ill., tornado, Sept. 14, 1928.** *Monthly Weather Review*, 56:354–355, **1928.** 2 photos. **DWB**—Description.

E-236 Flora, S. D., **Tornadoes in Kansas.** *Monthly Weather Review*, 57:97–98, **1929. DWB**—Description. Difficulty of prediction noted.

E-237 Flora, S. D., **What a tornado looks like.** *Monthly Weather Review*, 57:337–338, **1929. DWB.**

E-238 Hale, P. G., **Pensacola waterspout of June 14, 1929.** *Monthly Weather Review*, 57:338–339, **1929.** photo, table. **DWB**—Description and synoptic analysis.

E-239 Hillecke, C., **Windhose in 10 m Entfernung.** [Wind spout at 10 meters distance.] *Annalen der Hydrographie und maritimen Meteorologie*, 57:308, Sept. **1929.** 2 figs. **DLC**—Brief account.

E-240 Hurd, W. E., **Waterspout on Hillsborough Bay, Tampa, Fla., April 2, 1929.** *Monthly Weather Review*, 57:249–250, **1929.** fig. **DWB**—Description.

E-241 John, Heinz, **Entwicklung einer Trombe im Mittelländischen Meer.** [Development of a spout in the Mediterranean Sea.] *Annalen der Hydrographie und maritimen Meteorologie*, 57:307–308, Sept. **1929.** plate. **DLC.**

E-242 Blackstock, I. B., **The Hardtner tornado of June 2, 1929.** *Monthly Weather Review*, 58:325, **1930.** photo. **DWB**—Description.

E-243 Dice, Marion E., **Tornado at Vernon, Calif., March 15, 1930.** *Monthly Weather Review*, 58:324–325, **1930.** 5 figs., 4 refs. **DWB**—Description and brief synoptic analysis.

E-244 Linney, C. E., **Tornado in New Mexico.** *Monthly Weather Review*, 58:254, 256, **1930. DWB**—Brief note.

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PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

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Journal of Meteorology, Volume 7, Number 2, April 1950.

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Kiveliovitch, M. and Roulleau, J.: **Sur l'évolution des gouttes d'eau dans l'atmosphère,** [On the evolution of water drops in the atmosphere], p. 1–6.

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Petit, M.: **Note sur l'utilisation pratique des hygromètres à baudruche,** [On the practical utilization of gut (gold beater's skin) hygrometers], p. 19–25.

Kiveliovitch, M.: **Sur la composante verticale du vent,** [On the vertical component of wind], p. 26–31.

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Brooks, C. E. P.: **Relation between number of days with 0.4 in. or more of rain and total rainfall,** p. 152–153.

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